

WAD 2917 FF# \$14F 9.9.93

September 9, 1993

**CERTIFIED MAIL** 

FILE COPY

Mr. David Croxton EPA Project Coordinator U.S. EPA 1200 Sixth Avenue, M/S HW-106 Seattle, WA 98101



Mr. Croxton:

Attached is the Bimonthly Progress Report required by the 3008(h) Order for RFI activities completed at the Burlington Environmental Inc. Pier 91 Facility for the months of July and August 1993.

If you have any questions or require further information, please contact me at (206) 654-8153.

Sincerely,

John Stiller

CC:

Project Coordinator

Barb Smith, Ecology NWRO





#### MEMORANDUM

DATE:

September 9, 1993

RECEIVED

TO:

John Stiller

SEP 9 1993

FROM:

Joe Depner \( \int \mathcal{D} \)

BURLINGTON ENVIRONMENTAL, INC. CORPORATE OFFICE

CC:

Gary Podrabsky Nate Mathews Dave Haddock

SUBJECT: RFI BIMONTHLY PROGRESS REPORT, PIER 91 FACILITY

(JULY TO AUGUST 1993)

This memorandum summarizes the progress of the Burlington Environmental Inc. (Burlington) Pier 91 RCRA facility investigation (RFI), from July 1 to August 31, 1993. This is the seventh bimonthly progress report for the Pier 91 RFI. The RCRA 3008(h) order for the facility requires that progress reports be submitted bimonthly until the order is terminated.

#### DESCRIPTION AND ESTIMATE OF WORK COMPLETED

The following work was completed during the reporting period:

- Fluid levels in monitoring wells at the facility were measured twice; once during July and once during August.
- A land survey of the Pier 91 facility was performed. The survey results are expected to be delivered to Burlington during early September.
- Work continued on the draft RFI report.
- Pressure buildups and combustible gas levels of wellhead exhaust from monitoring wells CP-106B, CP-115B and CP-122B were checked.
- Most of the laboratory data reports for the July 1993 quarterly groundwater sampling event were received and the data have been validated.
- Laboratory analysis results from the April 1993 groundwater sampling event were entered into Burlington's database management system (GIS/Key). Efforts to enter the laboratory analysis results for soil samples collected during previous investigations began.

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Memorandum from Joe Depner

Subject: RFI Bimonthly Progress Report, Pier 91 (July-August, 1993)

September 9, 1993

- A meeting and numerous telephone discussions were held with representatives of USEPA, to discuss the details of pending RFI Work Plan variance requests submitted earlier by Burlington.
- A data package was compiled and submitted to the USEPA, in support of a work plan variance request involving well MW-39-3 and proposed well CP-120.
- The proposed decommissioning procedure for temporary shallow piezometer CP-122A was revised, and a description of the procedure was submitted to the USEPA.
- Efforts to answer the interim corrective measures justification questions presented in the RFI Work Plan continued.

#### SUMMARY OF ALL FINDINGS

Attached are copies of the laboratory data reports for the groundwater samples collected during the April 1993 groundwater sampling event.

Burlington has learned that the deep water-supply well north of Cold Storage Building W-39, and approximately due west of the pipe alley at the Burlington Pier 91 facility, was sampled on May 3, 1993. The results of the analyses, which are attached, were made available to Burlington by representatives of the Seattle Water Department.

No pressure buildup was observed in well CP-122B during the August water-level measurement effort, while the buildup in well CP-106B was observed to be slight and that of well CP-115B was moderate. These observations seem to support the hypothesis that the pressure buildups in these wells are decreasing with time. Combustible gas indicator (CGI) readings of wellhead exhaust ranged from 14 to 114 percent of the lower explosive limit (%LEL) in well CP-122B, from 25 to 392 %LEL in well CP-106B, and from 43 to 340 %LEL in well CP-115B. CGI readings of wellhead exhaust generally decreased with time, to less than 100 %LEL, within approximately 1.5 hour of wellhead venting. The CGI was calibrated with pentane.

## PROJECTED WORK FOR THE NEXT REPORTING PERIOD

The following activities are projected for the next reporting period, which is from September 1 to October 31, 1993:

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Memorandum from Joe Depner

Subject: RFI Bimonthly Progress Report, Pier 91 (July-August, 1993)

September 9, 1993

- Fluid levels in the monitoring wells will be measured monthly.
- The next quarterly round of groundwater sampling will be performed in the early part of October 1993.
- The data from the March tidal monitoring field session will be analyzed and the results will be included in the draft RFI report.
- Contour maps of monthly water levels will be compiled and submitted to USEPA in early September
- The QA/QC review of the chemical analysis results for the July 1993 quarterly groundwater sampling event is expected to be completed during the first week of September 1993. The results will be entered into the GIS.
- Burlington's response to the interim measures justification questions presented in the Pier 91 RFI Work Plan will be compiled and submitted to the USEPA by September 27.
- The draft RFI report will be submitted to the USEPA by October 25.

Please contact me if you have any questions about the above information.

Attachments

Date: May 6, 1993

RECEIVED

To: Brian Spindor, SWD Engineering

AUG 1 8 1993

From: Brian Hoyt, Water Quality Lab.

Burlington Environment of this. Technical Services

Subject: Pier 91 Well Analysis and Comments

The test parameters were chosen to provide the most information with the least labor and expense because of the very preliminary stage of this investigation. More extensive testing would be necessary if preliminary analysis of yield/aquifer drawdown, well head protection, and water quality data looked favorable. Based on this set of sample results it doesn't look like a source SWD should be pursuing for integration into our system.

The test results indicate a low hardness, moderately alkaline water with high levels of conductivity (TDS), sodium, chloride, ultra violet absorbance (organics), phosphate and ammonia-Nitrogen. The following table indicates the probable treatment or dilution needed to make this water compatible with present Seattle water:

15		
Problem Constituent	Problem Caused	Probable Action Required
S.Conductance	TDS incon- sistancy for industrial users	Dilution: 20% well/ 80% Cedar (to maintain S.C. below 2X normal level)
Sodium	Dietary source of Na should stay below 20mg/L	Dilution: 14% well/ 86% Cedar (@ Na = 15mg/L, assumes NaOCl dosage of 18mg/L is needed)
Chloride	Increased corrosivity	Dilution: unknown ratio (to keep sulfate + halide/ alkalinity ratio < 1.0)
U.V. Abs.	DBP pre- cursors & corrosivity increases	Dilution: 5% well/ 95% Cedar (to maintain DPB's below projected new regulations)
Phosphates	Algae growth and bacteria re-growth stimulant	Dilution: 2% well/ 98% Cedar (to keep P below 0.1 mg/L)
Ammonia-N	High chlorine dosage requirement (high cost)	Chlorine dosage needed to oxidize NH3 and provide purely free Cl2 residual without odor problems = 18 mg/L.

market mark

In summary, the water Quality problems presented here should preclude further consideration of this source as an addition to the Seattle system. When looking at possible ground waters for supplemental supplies, it is best to assume that suitable pipelines or reservoirs in which consistent blending can be accomplished will be needed.

Please call if you have any questions regarding the interpretation of these test results.

## (Samples Collected 5/3/93)

<u>Parameter</u>	Result

Hardness pH	152 mg/L as CaCO <sub>3</sub> 35.4 mg/L " " 8.19 400 micromhos/cm
Ortho PO <sub>4</sub> -P Iron	4. mg/L (screening test) 0.1 mg/L ( " ")
Fluoride Chloride Sodium	0.27 mg/L 30. mg/L(screening test) 77. mg/L( " ")
Odor character Diss. Oxygen U.V. Abs.	sulfite/sulfide 0.8 mg/L 1.286 / 5cm @ 254nm
Turbidity NH3-N NO3+NO2-N	0.3 NTÚ 1.7 mg/L (screening test) <0.1 mg/L ( " ")
Het. Plate Count Coliform	5 cfu/mL Absent

cc: Bob Schwartz
Rich Donner
Darrell Reimer
Jan Martin
Sarah Miller

## PROJECT MEMORANDUM

DATE:

July 21, 1993

TO:

Joe Depner, Hydrogeologist

FROM:

Nels Cone, Chemist Mc

PROJECT:

Burlington Pier 91 RFI

Project Number 624878

SUBJECT:

VALIDATION OF GROUNDWATER ANALYTICAL RESULTS DATA SETS

10A-10C

On April 4, 1993, four water samples were collected by Burlington Environmental Inc. personnel. These samples were submitted to Sound Analytical Services of Tacoma, Washington for volatile organic (EPA SW-846 Method 8240), semivolatile organic (EPA SW-846 Method 8270), and Total Petroleum Hydrocarbon (EPA SW-846 Methods 418.1 and 8015 Modified) analyses (work order 31234). I performed a review of the analytical results for the samples listed below.

CP-104A-0493

CP-104B-0493

CP-105A-0493

CP-105B-0493

A properly completed chain-of-custody form was included (6319). The sample was shown as having been properly iced and received in good condition. Holding times were evaluated according to regulatory protocol (*National Functional Guidelines for Organic Data Review*, USEPA, 1990). The sample received the analyses required by the Quality Assurance Project Plan (QAPP), and laboratory extraction/analysis times met the established guidelines. Proper data qualifier flags were used by the laboratory with the exceptions noted below.

#### Data Set 10A:

For volatile analyses, the holding times met USEPA requirements. The method blank contained methylene chloride and acetone; results received the proper "B" data qualifier flag as needed. All surrogate recoveries were within required quality control (QC) limits. Matrix spike/matrix spike duplicate analyses demonstrated appropriate analytical accuracy and relative percent differences (RPD) between the two analyses indicate acceptable analytical precision. Supporting QC documentation included bromofluorobenzene tuning data, continuing calibration verification, and sample chromatograms. Data consistency was demonstrated throughout.

#### Data Set 10B:

The holding times for semivolatile analyses met USEPA requirements. Di-n-butylphthalate, di-n-octylphthalate and bis(2-ethylhexyl)phthalate appear as laboratory contaminants; results for these analytes did not always receive the required "B" data qualifier flag. Surrogate recoveries for the sample were within QC limits. Matrix spike/matrix spike duplicate (MS/MSD) analyses were within established QC limits. The RPDs indicate acceptable analytical precision.

Page 2

Memorandum from Nels Cone

Subject: Pier 91 Data Validation, Data Set #10A-10C

July 21, 1993

Supporting QC documentation included decafluorotriphenylphosphine tuning data, continuing calibration verification and sample chromatograms. Data consistency was demonstrated throughout.

#### Data Set 10C:

Results from Total Petroleum Hydrocarbon analyses indicate that holding times for this sample satisfied USEPA requirements. Surrogate recoveries were within required QC limits. Duplicate analyses were performed, and appropriate analytical precision is displayed. Matrix spike analyses indicate required analytical accuracy was achieved. The method blank analysis results met required QC criteria and no corrections were needed. Supporting QC documentation included continuing calibration curves along with sample, spike and method blank chromatograms. Data consistency was demonstrated throughout.

#### **RECOMMENDATIONS**

In order to satisfy the data quality objectives as defined in Table F-2 of the QAPP, the following actions should be taken. All reported detections of di-n-butylphthalate, di-n-octylphthalate and bis(2-ethylhexyl)phthalate should receive "B" data qualifier flags. This data set can then be considered valid for its intended use.

#### PROJECT MEMORANDUM

DATE:

July 21, 1993

TO:

Joe Depner, Hydrogeologist

FROM:

Nels Cone, Chemist

PROJECT:

Burlington Pier 91 RFI

Project Number 624878

SUBJECT:

VALIDATION OF GROUNDWATER ANALYTICAL RESULTS DATA SETS

11A-11D

During the period of April 6-14, 1993 twenty-eight water samples were collected by Burlington Environmental Inc. personnel. These samples were submitted to Sound Analytical Services of Tacoma, Washington for volatile organic (EPA SW-846 Method 8240), semivolatile organic (EPA SW-846 Method 8270, material density (Standard Method 213E) and Total Petroleum Hydrocarbon (EPA SW-846 Methods 418.1 and 8015 Modified, and WDOE Method WTPH-HCID) analyses (work orders 31280, 31308, 31340, 31367, 31409, 31428, and 31448). I performed a review of the analytical results for the samples listed below.

CP-W10-0493 CP-39-3-0493 CP-103A-0493 CP-105A-0493 CP-106A-0493	CP-108A-0493 CP-108B-0493 CP-109-0493 CP-109M-0493 CP-110-0493 CP-111-0493	CP-113-0493 CP-114-0493 CP-115A-0493 CP-115B-0493 CP-115M-0493 CP-116-0493	CP-117-0493 CP-118-0493 CP-119-0493 CP-121-0493 CP-122B-0493 CP-911-0493
CP-106B-0493 CP-107-0493	CP-111-0493 CP-112-0493	CP-116-0493 CP-116M-0493	CP-911-0493 CP-915A-0493

Properly completed chain-of-custody forms were included (numbers 6225, 6322, 6323, 6325, 6287, 6326, and 6327). The samples were shown as having been properly iced/refrigerated and received in good condition. Holding times were evaluated according to regulatory protocol (*National Functional Guidelines for Organic Data Review*, USEPA, 1990). The samples received the analyses required by the Quality Assurance Project Plan (QAPP), with all field holding and laboratory extraction/analysis times meeting the established guidelines. Proper data qualifier flags were used by the laboratory with the exceptions noted below. Field duplicate results indicate that appropriate analytical precision was achieved for all analyses.

#### Data Set 11A:

For volatile analysis, all sample holding times met USEPA guidelines. The method blanks contained methylene chloride, acetone, and toluene; results did not always receive the required "B" data qualifier flag. Trip blank results were consistent with those of the laboratory method blank. All surrogate recoveries were within required quality control (QC) limits. Matrix spike/matrix spike duplicate analyses demonstrated appropriate analytical accuracy. Several samples required dilution, resulting in

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Memorandum from Nels Cone

Subject: Pier 91 Data Validation, Data Set 11A-11D

July 21, 1993

a corresponding increase in reported quantitation limits (PQLs). Supporting QC documentation in the form of bromofluorabenzene tuning data and continuing calibration verification was provided.

#### Data Set 11B:

Holding times for semivolatile analyses of all samples satisfied USEPA requirements. Both di-nbutylphthalate and bis(2-ethylhexyl)phthalate were detected as laboratory contaminants; results for these analytes did not always receive the required "B" data qualifier flag. Surrogate recoveries for all samples were within QC limits except when samples received significant dilution specifically samples CP-115A-0493 and CP-117-0493. This dilution also resulted in elevated PQLs for these samples. Matrix spike/matrix spike duplicate analyses display analytical accuracy within QC limits with the exception of 1,4-dichlorobenzene and 1,2,4-trichlorobenzene. Overall, analytical accuracy remains intact because these analytes were not detected in the samples and the RPDs between these two results indicate acceptable analytical precision. Supporting QC documentation in the form of decafluorotriphenylphosphine tuning data and continuing calibration verification was provided.

#### Data Set 11C:

Holding times for Total Petroleum Hydrocarbon analyses of all samples satisfied USEPA requirements. Surrogate recoveries were within required QC limits, except as expected when samples being analyzed were actual product. Results from duplicate analyses displayed appropriate analytical precision. Matrix spike analyses indicate required analytical accuracy was achieved. The method blank analyses results met required QC criteria and no corrections were needed. Additional QC documentation in the form of laboratory check standards and initial and continuing calibration verification has been provided.

#### Data Set 11D:

Holding times for all samples satisfied USEPA requirements. Method blank analyses met required QC criteria and no corrections were needed. Duplicate analyses results indicate appropriate analytical precision was achieved. Laboratory check standard results display analytical accuracy within QC limits.

#### **RECOMMENDATIONS:**

In order to satisfy the data quality objectives as defined in Table F-2 of the QAPP, the following actions should be taken. All reported detections of methylene chloride and acetone should receive "B" data qualifier flags. All reported detections of di-n-butylphthalate and bis(2-ethylhexyl)phthalate should receive "B" data qualifier flags. These data can then be considered valid for their intended use.

## PROJECT MEMORANDUM

DATE:

July 26, 1993

TO:

Joe Depner, Hydrogeologist

FROM:

Nels Cone, Chemist Mc

PROJECT:

Burlington Pier 91 RFI

Project Number 624878

SUBJECT:

VALIDATION OF GROUNDWATER ANALYTICAL RESULTS DATA SETS

10D-10E

During the period of April 5 to 14, 1993, thirty-two water samples were collected by Burlington Environmental field personnel. These samples were submitted to Burlington Corporate Laboratory for metals analysis (EPA SW-846 Methods 3010, 6010 and 7000 series) and PCB analysis (EPA SW-846 Method 8080), (work orders 46052, 46076, 46115, 46145, 46175, 46209, 46245 and 46278). I performed a review of the analytical results for the following samples:

CP-W10-0493	CP-106A-0493	CP-111-0493	CP-116M-0493
CP-39-3-0493	CP-106B-0493	CP-112-0493	CP-117-0493
CP-103A-0493	CP-107-0493	CP-113-0493	CP-118-0493
CP-103B-0493	CP-108A-0493	CP-114-0493	CP-119-0493
CP-103B-0493	CP-108A-0493	CP-115A-0493	CP-121-0493
CP-104A-0493	CP-109-0493	CP-115B-0493	CP-122B-0493
CP-105A-0493	CP-109M-0493	CP-115M-0493	CP-911-0493
CP-105B-0493	CP-110-0493	CP-116-0493	CP-915A-0493

## **Findings**

Properly completed chain-of-custody forms were included (numbers 6330, 6224, 6328, 6324, 6320, 6321, 6277 and 6286). The samples were shown as having been properly iced and received in good condition. All holding times were evaluated according to regulatory protocol (*National Functional Guidelines for Organic (and Inorganic) Data Review*, USEPA, 1991). The samples received the analyses required by the Quality Assurance Project Plan (QAPP), and laboratory extraction/analysis times met the established guidelines. Field duplicate results indicate that appropriate analytical precision was achieved.

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Memorandum from Nels Cone

Subject: Data Validation of Analytical Results, Data Sets 10D-10E

July 26, 1993

#### 10D

For metal analysis, matrix spike/matrix spike duplicate results displayed analytical accuracy within USEPA guidelines. Method blank data were within quality control (QC) limits. All laboratory control samples, initial calibration verification, and continuing calibration verification data met requisite criteria for analytical precision.

#### 10E

Surrogate recoveries for all PCB analyses were within QC limits with the exception of tetrachloro-m-xylene (TCMX) recovery for sample CP-122B-0493; overall, the data remain unaffected. When samples required dilution, a corresponding increase in reported quantitation limts (PQLs) was noted. All method blank data met QC criteria. Matrix spike/matrix spike duplicate results satisfied QC criteria for analytical accuracy. Continuing calibration verification provided further demonstration of analytical precision. The data quality objectives as defined in Table F-2 of the QAPP are met. Proper data qualifiers were used by the laboratory as needed.

#### Recommedations

These data can be considered valid for their intended use.



RECEIVED

May 10, 1993

MAY 1 0 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Burlington Environmental Inc. Technical Services

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46209

Dear Joe:

Two water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 13, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
AALA	4/14/93	4/15/93
	GC Run Number(s) AALA	GC Han Handerick

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model		
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer		
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic		
. 230.20, 30.00.20.		Absorption Spectrometer		
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma		
Chromium, Nickel, Zinc	Α.	Atomic Emission Spectrometer		

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

enclosure



## BURLINGTON FISTYTELLINGFOLIAL

#### General Laboratory Report

: 46209 Lab Number

Plant/Generator Name : Pier 91; Project #624878 TASK 7306 Sample Type : Groundwater; CP-121, -110

Date of Receipt : 04/13/93 Analyst: BLW, BB, EL, DKW
Date of Report : 05/10/93 QC Checked: Xatta Oxigo Analyst: BLW, BB, EL, DKW

Parameters for Analysis: PCBs, Total and Dissolved Metals

: None Outside Lab Report No: Outside Lab

#### Data:

These two groundwater samples from the Pier 91 Project #624878 Task 7306, sample numbers CP-121-0493 and CP-110-0493 were analyzed for PCBs by Method 8080 and for Total and Dissolved Metals by Methods 7000 and 6010. Copies of all results are attached.

Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

## CHAIN-OF-CUSTODY RECORD

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## PCB Laboratory Report Page 1

Lab Number : 46209

/ PIER 91 Pj# 624878 TASK 7306 Plant/Generator Name :

: GROUNDWATER

Sample Type
Date of Receipt
Date of Report : 04/13/93 : 04/29/93 Analyst: BLW, BB, EL, DKW QC Checked: (女女 5/3/12) Outside Lab Report No: Outside Lab : NONE

Number of Samples

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AALA46 AALA45 AALA40 AALA41	B04143-4 M04143-4 46209-1 46209-2	BLANK METHOD SPIKE CP-121-0493 CP-110-0493		1248	<0.1ppb 135% <0.1ppb <0.1ppb
AALA37	CCV	5 PPM CCV (111%		1248	5.58
AALA48	CCV	5 PPM CCV (112%	lu I	1254	5.61

Instrument: Hewlett Packard 5890 G.C.

Analysts: Al Flores-Serrano and Della Kay Wilson

Lab Number : 46209

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/13/93 Analyst: BLW, BB, EL Date of Report : 04/27/93 QC Checked QC Checked

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Watala.	46209-1 TOTAL CP-121-0493	46209-1 DISS. CP-121-0493	46209-2 TOTAL CP-110-0493	46209-2 DISS. CP-110-0493
Metals:			<0.010	<0.010
Silver	<0.010	<0.010		
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.
PATES ANALYZED: 4/14/93, 4/15/93, 4/20/93, 4/22/93/26/93, 4/27/93.

Lab Number

: 46209

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt : 04/13/93
Date of Report : 04/27/93

Analyst: BLW, BB, EL QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

:-~NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46209-2 MS % RECOVERY	46209-2 MSD % RECOVERY	% RECOVERY ICV
Silver	101.8	101.8	
Arsenic	91.8	92.2	109.2
Barium	99.7	99.0	
Beryllium	102.2	101.6	
Cadmium	99.8	99.6	
Chromium	99.8	99.6	
Copper	100.1	99.8	
Mercury	98.1	94.5	101.0
Nickel	99.8	99.3	
Lead	94.0	93.5	91.5
Selenium	102.6	101.6	105.5
Zinc	102.0	102.1	

## Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

: 46209Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

: GROUNDWATER Sample Type

Date of Receipt : 04/13/93 Analyst: BLW, BB, EL

Date of Report : 04/27/93 QC Checked: Analysis: TOTAL AND DISSOLVED METALS

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

Motals:	PREPARATION BLANK MG/L	CONTROL SAMPLE % RECOVERY	% RECOVERY CCV	CCV	
Metals: Silver	<0.010	96.5	103.0	100.8	
			97.7	95.2	
Arsenic	<0.010	87.2			
Barium	<0.20	98.6	101.2	99.6	
Beryllium	<0.005	106.0	99.9	98.6	
Cadmium	<0.005	109.2	100.3	101.0	
Chromium	<0.010	105.0	100.5	101.1	
Copper	<0.025	101.2	100.3	100.8	
Mercury	<0.0002	101.7	74.4		
Nickel	<0.040	108.0	104.8	104.4	
Lead	<0.003	90.5	96.8	4	
Selenium	<0.005	108.3	100.5		
Zinc	<0.020	109.8	99.2	99.8	

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 46209Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt

: 04/13/93

Analyst: BLW, BB, EL, OC Checked About 4/31/93

Date of Report

. 04/13/93 : 04/27/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

Metals:

CCV

Arsenic

92.8

Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

# BURLINGTON ENVIRONMENTAL

CHAIN-OF-CUSTODY RECORD

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RECEIVED

May 10, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

MAY 1 0 1993

Burlington Environmental Inc. Technical Services

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46052

Dear Joe:

Four water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 05, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
46052-4, M04083-1, and B04083-1	AAKZ	4/08/93	4/13/93
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

Rathly & Drys

enclosure



## General Laboratory Report

Lab Number : 46052

Plant/Generator Name : Pier 91; Project #624878 Task 7203

Sample Type : Groundwater; CP-105B, -105A, -104B, -104A Date of Receipt : 04/05/93 Analyst: BB,EL,JLB,DKW

Date of Receipt : 04/05/93 Analyst: BB, EL, JLB, DKW
Date of Report : 05/07/93 QC Checked: Kaling Nufs

Parameters for Analysis: Total and Dissolved Metals, PCBs

Outside Lab : None Outside Lab Report No:

#### Data:

These water samples from the Pier 91 Project #624878, Task 7203, sample numbers CP-105B-0493, CP-105A-0493, CP-104B-0493, CP-104A-0493, were analyzed for Total and Dissolved Metals by EPA Methods 7000 and 6010 and for PCBs by EPA Method 8080. Copies of the results are attached.

Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173

## **CHAIN-OF-CUSTODY RECORD**

C.O.C. SERIAL NO. \_\_\_\_6330

618/281-5120 FAX															
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#### Page 1 PCB Laboratory Report

: 46052 Lab Number

/ PIER 91 Pj# 624878 TASK 7203 Plant/Generator Name

: GROUNDWATER

Sample Type Date of Receipt Analyst: BB, EL, JLB, DKW QC Checked: 40 5193 : 04/05/93 : 04/29/93 Date of Report Outside Lab Report No: : NONE Outside Lab

Number of Samples

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AAKZ40 AAKZ41	46052-4 CCV	CP104A-0493 5 PPM CCV (111%		1254	<1.0ppb 5.56
AAKZ30	CCV	5 PPM CCV (111%		1248	5.56
AAKZ27 AAKZ26 AAKZ19	B04083-1 M04083-1 CCV	BLANK METHOD SPIKE 5 PPM CCV (89%)		1248 1254	<0.1ppb 135% 4.46

Instrument: Hewlett Packard 5890 G.C.

Analysts: Al Flores-Serrano and Della Kay Wilson

Lab Number : 46052

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7203

: GROUNDWATER Sample Type

Analyst: BB, EL, JLB : 04/05/93 Date of Receipt Date of Report : 04/16/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS /

Outside Lab Report No: Outside Lab : NONE

METALS BY SW-846 3010, 6010, 7000.

	46052-1 TOTAL	46052-1 DISS.	46052-2 TOTAL	46052-2 DISS.
Metals:	CP-105B-0493	CP-105B-0493	CP-105A-0493	CP-105A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	0.054	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

#### <u>Comments</u> and <u>Conclusions:</u>

ESULTS ARE REPORTED IN MG/L.

ATES ANALYZED: 4/9/93, 4/12/93, 4/13/93, 4/14/93.

Lab Number

: 46052

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7203

Sample Type

: GROUNDWATER

Analyst: BB, EL, JLB

Date of Receipt : 04/05/93 Analyst: BB,
Date of Report : 04/16/93 QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS/

Outside Lab

: NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46052-3 TOTAL CP-104B-0494	46052-3 DISS. CP-104B-0494	46052-4 TOTAL CP-104A-0494	46052-4 DISS. CP-104A-0494
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

Lab Number : 46052Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7203

Sample Type : GROUNDWATER

Date of Receipt : 04/05/93 Analyst: BB,

Date of Report : 04/16/93 QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS Analyst: BB, EL, JLB

Outside Lab Report No: Outside Lab : NONE

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK (MG/L)	CONTROL SAMPLE % RECOVERY	46052-2 MS % RECOVERY	46052-2 MSD % RECOVERY
Silver	<0.010	75.7	102.0	84.2
Arsenic	<0.010	92.5	100.0	102.5
Barium	<0.20	105.7	101.6	107.0
Beryllium	<0.005	106.6	103.2	109.4
Cadmium	<0.005	99.5	94.4	97.4
Chromium	<0.010	99.3	96.4	99.8
Copper	<0.025	106.3	103.0	106.6
Mercury	<0.0002	102.4	103.8	103.8
Nickel	<0.040	102.8	97.7	101.8
Lead	<0.003	103.0	88.0	89.5
Selenium	<0.005	106.3	118.2	109.0
Zinc	<0.020	106.4	100.5	107.1

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number : 46052Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7203

Sample Type : GROUNDWATER

Date of Receipt : 04/05/93 Analyst: BB EL, JLB Date of Report : 04/16/93 QC Checked

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	% RECOVERY ICV	ICV	CCV	CCV	,
Silver			102.1	102.0	
Arsenic	108.4	101.9	93.1	96.7	
Barium	100.1		104.9	103.9	
Beryllium			99.9	99.5	
Cadmium			94.1	94.5	
Chromium			96.4	97.0	
Copper			102.9	103.0	4.
Mercury	96.3				
Nickel	2010		98.5	103.3	
Lead	93.7		99.6	98.0	
Selenium	97.5		104.8	90.1	
Zinc	57.5		99.0	97.9	

## <u>Comments</u> and <u>Conclusions</u>:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 46052Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7203

Sample Type

: GROUNDWATER

Date of Receipt

: 04/05/93

Analyst: BB, EL, JLB,

Date of Report

QC Checked :-

: 04/16/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

Metals:	CCV	CCV	CCV
Arsenic	99.2	93.2	92.8
Lead	95.6		
Selenium	92.8	90.8	

## Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

## **CHAIN-OF-CUSTODY RECORD**

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#### RECEIVED

MAY 1 0 1993

May 10, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Burlington Environmental Inc. Technical Services

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46115

Dear Joe:

Five water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 7, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
46115-1,2,3,4,5, M04083-1, and B04083-1	AAKZ, CAFX	4/08/93	4/12/93, 4/27/93
	•		

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model				
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer				
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic				
		Absorption Spectrometer				
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma				
Chromium, Nickel, Zinc		Atomic Emission Spectrometer				

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

Tathy C Dreps

enclosure



#### General Laboratory Report

Lab Number : 46115

Plant/Generator Name : Pier 91; Project #624878 Task 7306

Sample Type : Groundwater; CP-111, -911, -113, -114, -112

Date of Receipt : 04/07/93 Analyst: BB, EL, JLB, DKW
Date of Report : 05/07/93 QC Checked: Katty Negs

Parameters for Analysis: Total and Dissolved Metals, PCBs

Outside Lab : None Outside Lab Report No:

#### Data:

These water samples from Pier 91 Project #624878, Task 7306, sample numbers CP-111-0493, CP-911-0493, CP-113-0493, CP-114-0493, CP-112-0493 were analyzed for Total and Dissolved Metals by Methods 7000 and 6010 and PCBs by Methods 8080. Copies of the results are attached.

Comments and Conclusions:



## **CHAIN-OF-CUSTODY RECORD**

C.O.C. SERIAL NO. 6328

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## PCB Laboratory Report

Page 1

: 46115 Lab Number

/ PIER 91 Pj# 624878 TASK 7306 Plant/Generator Name :

: GROUNDWATER Sample Type

Analyst: BB, EL, JLB, DKW QC Checked: XX SINING Outside Lab Report No: Date of Receipt Date of Report : 04/07/93 : 04/29/93 : NONE

Outside Lab

Number of Samples

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AAKZ27	B04083-1	BLANK			<0.1pp0
AAKX26	M04083-1	METHOD SPIKE		1248	135%
CAFX21	46115-1	CP-111-0493			<50ppb
CAFX22	46115-2	CP-911-0493			<50ppb
AAKZ22	46115-3	CP-113-0493	· · · · · · · · · · · · · · · · · · ·		<0.1ppb
AAKZ23	46115-4	CP-114-0493			<0.1ppb
AAKZ24	46115-5	CP-112-0493			<0.1ppb
AAKZ19	CCV	5 PPM CCV (89%)		1254	4.46
AAKZ30	CCV	5 PPM CCV (111%		1248	5.57
		)			
CAFX15	CCV	5 PPM CCV (101%		1248	5.04
		).			
CAFX26	CCV	5 PPM CCV (110%		1248	5.49
		)			

Instruments: Hewlett Packard 5890 and 5890 Series II G.C.s

Analysts: Al Flores-Serrano and Della Kay Wilson

: 46115 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/07/93 Analyst: BB, EL, JLB,

Date of Report : 04/20/93 QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46115-1 TOTAL CP-111-0493	46115-1 DISS. CP-111-0493	46115-2 TOTAL CP-911-0493	46115-2 DISS. CP-911-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

ATES ANALYZED: 4/14/93, 4/15/93, 4/16/93, 4/19/93

: 46115 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt : 04/07/93 Analyst: BB, EL, JLB Date of Report : 04/20/93 QC Checked: JCALLE HACKED

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46115-3 TOTAL CP-113-0493	46115-3 DISS. CP-113-0493	46115-4 TOTAL CP-114-0493	46115-4 DISS. CP-114-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

# Comments and Conclusions:

RESULTS ARE REPORTED IN MG/L.

: 46115 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

: GROUNDWATER Sample Type

: 04/07/93 Analyst: BB EL, JLB Date of Receipt

QC Checked: Madila (1/210) Date of Report : 04/20/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	46115-5 TOTAL	46115-5 DISS.	46115-1 MS	46115-1 MSD
Metals:	CP-112-0493	CP-112-0493	% RECOVERY	% RECOVERY
Silver	<0.010	<0.010		
Arsenic	<0.010	<0.010	85.0	87.5
Barium	<0.20	<0.20		
Beryllium	<0.005	<0.005		
Cadmium	<0.005	<0.005		
Chromium	<0.010	<0.010		
Copper	<0.025	<0.025		
Mercury	<0.0002	<0.0002	103.0*	99.5*
Nickel	<0.040	<0.040		
Lead	<0.003	<0.003	85.0	71.5
Selenium	<0.005	<0.005	80.0	50.0
Zinc	<0.020	<0.020		

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L. MERCURY SPIKES PERFORMED ON 46115-4.

Lab Number

: 46115

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/07/93 Analyst: BB EL, JLB

Date of Report : 04/20/93 QC Checked: With Call Color

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE Outside Lab-Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46115-3 MS % RECOVERY	36115-3 MSD % RECOVERY
Silver	104.2	97.2
Barium	95.4	97.7
Beryllium	102.0	107.4
Cadmium	100.0	107.2
Chromium	100.0	102.8
Copper	98.2	100.7
Nickel	100.0	104.6
Zinc	103.5	108.7

### Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number : 46115Q

Plant/Generator Name : PIER 91 Pj 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/07/93 Analyst: BB, EL, JLB,
Date of Report : 04/20/93 QC Checked: Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK MG/L	CONTROL SAMPLE % RECOVERY	% RECOVERY
Silver	<0.010	96.5	
Arsenic	<0.010	95.0	105.2
Barium	<0.20	98.6	
Beryllium	<0.005	106.0	
Cadmium	<0.005	109.2	
Chromium	<0.010	105.0	
Copper	<0.025	101.2	
Mercury	<0.0002	103.5	92.4
Nickel	<0.040	108.0	
Lead	<0.003	98.5	94.5
Selenium	<0.005	88.5	102.4
Zinc	<0.020	109.8	

#### Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 46115Q

Plant/Generator Name : PIER 91 Pj 624878 TASK 7306

Sample Type

: GROUNDWATER

Parameters for Analysis: TOTAL AND DISSOLVED METALS
Outside Lab : NONE Outside Lab

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	% RECOVERY CCV	CCV	CCV	CCV	
Silver	101.0	100.4			
Arsenic	92.5	100.8	102.4	108.8	
Barium	97.5	94.6			
Beryllium	98.7	96.8			
Cadmium	102.2	101.1			
Chromium	101.7	99.4	,		
Copper	99.4	98.0			
Mercury	103.5	108.6			
Nickel	101.6	100.2			
Lead	104.8	97.6	109.6	106.4	
Selenium	96.4	105.6	90.8	94.4	
Zinc	100.3	99.7			

# Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 461150

Plant/Generator Name : PIER 91 Pj 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt : 04/07/93 Analyst: BB, EL, ILB, Date of Report : 04/20/93 QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

& RECOVERY

Metals:	CCV	CCV	CCV	
Arsenic	97.2			
Lead	102.0	101.2	100.0	
Selenium	95.2			

### Comments and Conclusions:

SULTS ARE REPORTED IN PERCENT RECOVERY.



1	210 West Sand Bank Road
	P.O Box 330
1	Columbia, IL 62236-0330
	610/201.7177

# CHAIN-OF-CUSTODY RECORD

BE-34 (1/92)

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# RECEIVED

May 10, 1993

MAY 1 0 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Burlingten Environmental Inc. Technical Services

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46076

Dear Joe:

Four water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 6, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Run Number(s)	Date(s) Extracted	Date(s) Analyzed
AAKZ, CAFX	4/08/93	4/12/93, 4/27/93

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc	1	Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

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enclosure



# BURLINGTON

#### General Laboratory Report

: 46076 Lab Number

Plant/Generator Name : Pier 91; Project #624878 TASK 7306

Sample Type : Groundwater; CP-108-B, -108-A, -103-B, -103-A
Date of Receipt : 04/06/93 Analyst: BB,EL,JLB,DKW
Date of Report : 05/10/93 QC Checked: Author May

Parameters for Analysis: PCBs, Total and Dissolved Metals

Outside Lab Report No: : None Outside Lab

#### Data:

These four groundwater samples from the Pier 91 Project #624878, Task 7306, sample numbers CP-108-B-0493, CP-108-A-0493, CP-103-B-0493, CP-103-A-0493 were analyzed for PCBs by Method 8080 and for Total and Dissolved Metals by Methods 7000 and 6010. Copies of the results are attached.

Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173

### CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6224

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#### Page 1 PCB Laboratory Report

: 46076 Lab Number

/ PIER 91 Pj#624878 TASK 7306 Plant/Generator Name :

: GROUNDWATER Sample Type

Analyst: BB, EL, JLB, DKW QC Checked: S13/43 : 04/06/93 : 04/29/93 Date of Receipt
Date of Report
Outside Lab

Outside Lab Report No: : NONE

Number of Samples

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AAKZ27 AAKZ26 CAFX23	B04083-1 M04083-1 46076-2	BLANK METHOD SPIKE CP-108-A-0493		1248	<0.1pp 135% <10ppb
AAKZ19 AAKZ30	CCA	5 PPM CCV (89%) 5 PPM CCV (111%		1254 1248	4.46 5.57
CAFX15	CCV	5 PPM CCV (101%		1248	5.04
CAFX26	CCV	5 PPM CCV (110%		1248	5.49

Instruments: Hewlett Packard 5890 and 5890 Series II G.C.s

Analysts: Al Flores-Serrano and Della Kay Wilson

Lab Number : 46076

Plant/Generator Name : PIER 91 Pj#624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/06/93 Analyst: BB EL TB Man Half?

Date of Report : 04/19/93 QC Checked: Man Half?

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

	46076-1 TOTAL	46076-1 DISS.	46076-2 TOTAL	46076-2 DISS.
Metals:	CP-108-B-0493	CP-108-B-0493	CP-108-A-0493	CP-108-A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	0.011	0.011	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

ATES ANALYZED: 4/13/93, 4/14/93, 4/15/93, 4/16/93 /19/93.

Lab Number

: 46076

Plant/Generator Name : PIER 91 Pj#624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt

: 04/06/93

Analyst: BB EL, JLB

Date of Report

: 04/19/93

QC Checked: J.B. 41943

Parameters for Analysis: TOTAL AND DISSOLVED METALS Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46076-3 TOTAL CP-103-B-0493	46076-3 DISS. CP-103-B-0493	46076-4 TOTAL CP-103-A-0493	46076-4 DISS. CP-103-A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

Lab Number

: 46076

Plant/Generator Name : PIER 91 Pj#624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt : 04/06/93 Analyst: BB, EL, VIB
Date of Report : 04/19/93 QC Checked /// OUT 4/19/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals: Silver	46076-2 MS % RECOVERY 98.6	46076-2 MSD % RECOVERY 43.0	46076-3 MS % RECOVERY	46076-3 MSD % RECOVERY
Arsenic			102.5	105.0
Barium	103.6	105.4		
Beryllium	103.2	107.2		
Cadmium	94.0	98.6		
Chromium	98.4	98.4		
Copper	102.6	104.0		
Mercury			92.2	95.6
Nickel	97.2	100.7		
Lead			89.5	96.5
Selenium			88.1	89.2
Zinc	100.1	105.0		

#### Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number : 46076Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/06/93 Analyst: BB, EL, JLB, Date of Report : 04/19/93 QC Checked: 19/99

Parameters for Analysis: TOTAL AND DISSOLVED METALS/

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK MG/L	CONTROL SAMPLE % RECOVERY	ICV % RECOVERY	ICV % RECOVERY
Silver	<0.010	75.7		
Arsenic	<0.010	95.0	105.2	102.8
Barium	<0.20	105.7		
Beryllium	<0.005	106.6		
Cadmium	<0.005	99.5		
Chromium	<0.010	99.3		
Copper	<0.025	106.3	1	
Mercury	<0.0002	97.5		
Nickel	<0.040	102.8		
Lead	<0.003	98.5	94.5	
Selenium	<0.005	88.5	102.4	94.4
Zinc	<0.020	106.4		

# Comments and Conclusions:

RESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 460760

Plant/Generator Name

: PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt

: 04/06/93

Date of Report

Analyst: BB, EL, QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS

: 04/19/93

Outside Lab

: -NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

	% RECOVERI				
Metals:	CCV	CCV	CCV	CCV	
Silver	102.0	102.9			
Arsenic	100.0	95.2	100.8	102.4	
Barium	103.9	105.3			
Beryllium	99.5	99.9			
Cadmium	94.5	93.2			
Chromium	97.0	96.7			
Copper	103.0	104.6			
Nickel	103.3	98.0			
Lead	104.8	97.6	109.6	106.4	
Selenium	96.4	105.6	106.8	90.8	
Zinc	97.9	97.7			

#### Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 46076Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt

: 04/06/93 Analyst: BB ET JLB QC Checked: 1800 4/9/93

Date of Report

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

Metals:

CCV 102.0

Lead Selenium

94.4

# Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.



7210 West Sand Bank Road P.O. Box 330 Columbia, II. 62236-0330 Exa/281-7173 CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. \_

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#### RECEIVED

MAY 1 0 1993

May 10, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Burlington Environmental Inc. Technical Services

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46278

Dear Joe:

Six water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 15, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%, except for 46278-6MS which had a TCMX surrogate recovery of 185%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
46278-1,2,3,3MS,3MSD, 4,5,6,6MS,6MSD, and B04153-1	AALB, DAFV and DAFX	4/15/93 and 4/23/93	4/19/93, 4/23/93 and 4/27/93
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The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
125025, 55151224, 2515		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc	~	Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely.

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

Bully E Spreys

enclosure



#### General Laboratory Report

: 46278 Lab Number

Plant/Generator Name : Pier 91; Project #624878 Task 7306

: Groundwater; CP-W10, -109M, -109, -116M, -116, -39 Sample Type

Analyst: BLW, BB, EL, DKW Date of Receipt : 04/15/93 : 05/07/93 QC Checked: Kathy Kup) Date of Report

Parameters for Analysis: Total and Dissolved Metals, PCBs

: None Outside Lab Report No: Outside Lab

#### Data:

These water samples from the Pier 91 Project #624878, Task 7306, sample numbers CP-W10-0493, CP-109M-0493, CP-109-0493, CP-116M-0493, CP-116-0493, CP-39-3-0493 were analyzed for Total and Dissolved Metals by Method 7000 and 6010 and PCBs by Method 8080. Copies of the results are attached.

Comments and Conclusions:



210 West Sand Bank Road , P.O. Box 330 2 Columbia, IL 62236-0330 618/281-7173

# CHAIN-OF-CUSTODY RECORD

COC SERIAL NO. 6286

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# PCB Laboratory Report Page 1

Lab Number : 46278

Plant/Generator Name : / PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/15/93 Analyst: BLW, BB, EL, DKW
Date of Report : 04/29/93 QC Checked: ### 5/3/93
Outside Lab : NONE Outside Lab Report No:

Number of Samples : --

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AALB29 AALB20 AALB21 AALB22	B04153-1 46278-1 46278-2 46278-3	BLANK CP-W10-0493 CP-109M-0493			<0.1ppb <0.1ppb <0.1ppb <0.1ppb
DAFV108 DAFV109	46278-3M 46278-3M			1248 1248	120% 125%
AALB23 DAFX73 AALB25	46278-4 46278-5 46278-6	CP-116M-0493 CP-116-0493			<0.1ppb <50ppb <0.1ppb
AALB27	46278-6M	METHOD SPIKE SAMPLE CONCENTR ATED DUE TO EVAPORATION OF SOLVENT IN VIAL		1248	305%
AALB28	46278-6M	WITH LOOSE CAP. METHOD SPIKE DU PE (RSD=81%)		1248	130%
AALB15	CCV	5 PPM CCV (113%		1248	5.63
AALB26	CCV	5 PPM CCV (113%		1254	5.66
AALB37	CCV	5 PPM CCV (113%		1248	5.64
DAFV100 DAFV110	CCV	5 PPM CCV (99%) 5 PPM CCV (110%		1248	4.97 5.49
DAFX65 DAFX76	CCV	5 PPM CCV (91%) 5 PPM CCV (111%)		1248 1248	4.55 5.56

Instruments: Hewlett Packard 5890 and 5890 Series II G.C.s

Analysts: Al Flores-Serrano and Della Kay Wilson

Lab Number : 46278

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/15/93 Analyst: BLW, BB, FL Date of Report : 04/29/93 QC Checked: Monthly 4/20/14

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No: '

METALS BY SW-846 3010, 6010, 7000.

Metals:	46278-1 TOTAL CP-W10-0493	46278-1 DISS. CP-W10-0493	46278-2 TOTAL CP-109M-0493	46278-2 DISS. CP-109M-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

ATES ANALYZED: 4/16/93, 4/26/93, 4/27/93, 4/28/93

: 46278 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/15/93 Analyst: BLW, BB, EL,

Date of Report : 04/29/93 QC Checked (Control of the control of the con

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: ' : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

46278-3 TOTAL CP-109-0493	46278-3 DISS. CP-109-0493	46278-4 TOTAL CP-116M-0493	46278-4 DISS. CP-116M-0493	
	<0.010	<0.010	<0.010	
<0.010	<0.010	<0.010	<0.010	
<0.20	<0.20	<0.20	<0.20	
<0.005	<0.005	<0.005	<0.005	
<0.005	<0.005	<0.005	<0.005	
<0.010	<0.010	<0.010	<0.010	
<0.025	<0.025	<0.025	<0.025	
<0.0002	<0.0002	<0.0002	<0.0002	
<0.040	<0.040	<0.040	<0.040	
<0.003	<0.003	<0.003	<0.003	
<0.005	<0.005	<0.005	<0.005	
<0.020	<0.020	<0.020	<0.020	
	CP-109-0493 <0.010 <0.010 <0.20 <0.005 <0.005 <0.010 <0.025 <0.0002 <0.040 <0.003 <0.005	CP-109-0493         CP-109-0493           <0.010	CP-109-0493         CP-109-0493         CP-116M-0493           <0.010	CP-109-0493         CP-109-0493         CP-116M-0493         CP-116M-0493           <0.010

#### Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

: 46278 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

: GROUNDWATER Sample Type

Analyst: BLW BB, EI : 04/15/93 Date of Receipt Date of Report : 04/29/93 QC Checked

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: ' : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

Metals:	46278-5 TOTAL CP-116-0493	46278-5 DISS. CP-116-0493	46278-6 TOTAL CP-39-3-0493	46278-6 DISS. CP-39-3-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	0.004	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

Lab Number : 46278Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	46278-2 MS % RECOVERY	46278-2 MSD % RECOVERY	46278-6 MS % RECOVERY	46278-6 MSD % RECOVERY
Silver	104.8	102.8	101.4	101.8
Arsenic	98.2	99.4		
Barium	100.8	100.7	98.4	98.8
Beryllium	100.6	100.6	102.6	102.4
Cadmium	101.4	100.4	99.0	99.2
Chromium	101.6	102.4	100.4	99.2
Copper	102.1	101.4	100.0	100.1
Mercury	99.1	95.3		
Nickel	104.3	103.4	100.9	99.8
Lead	103.5	102.5		
Selenium	107.4	104.7		
Zinc	101.9	101.5	101.5	102.3

# Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number : 46278Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/15/93 Analyst: BLW BB, ELV Bate of Report : 04/29/93 QC Checked: 1/20/13

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK MG/L	CONTROL SAMPLE % RECOVERY	% RECOVERY	ICV
Silver	<0.010	105.1	96.2	
Arsenic	<0.010	102.0	98.4	
Barium	<0.20	99.2	99.5	
Beryllium	<0.005	100.2	99.6	
Cadmium	<0.005	102.3	99.3	
Chromium	<0.010	103.7	100.0	
Copper	<0.025	102.4	99.4	×
Mercury	<0.0002	91.5	93.9	
Nickel	<0.040	103.3	101.2	
Lead	<0.003	103.0	95.3	97.3
Selenium	<0.005	117.6	105.5	
Zinc	<0.020	105.5	99.4	

# Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 46278Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt : 04/15/93 Analyst: BLW, BB, EL,
Date of Report : 04/29/93 QC Checked: Railing HDATS
Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

	% RECOVERY			
Metals:	CCV	CCV	CCV	CCV
Silver	100.6	101.0		
Arsenic	104.9	105.9	108.6	
Barium	99.9	99.7		*
Beryllium	99.9	99.2		
Cadmium	100.5	100.2		
Chromium	100.7	99.0		
Copper	101.5	101.4		
Mercury	84.7	92.6		
Nickel	103.3	102.6		
Lead	102.8	100.0	99.2	101.2
Selenium	100.5	101.0	101.7	99.1
Zinc	99.5	100.5		

# Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 46278Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Analyst: BLW, BB, FL QC Checked

Date of Receipt : 04/15/93
Date of Report : 04/29/93

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

Metals:

CCV

Lead

99.2

Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.



# BURLINGTON ENVIRONMENTAL

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### RECEIVED

MAY 1 0 1993

Burlington Environmental Inc.

Technical Services

May 10, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 46145

Dear Joe:

Two water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 8, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report.

The analyst(s) name(s) and the instrument used for each analyte are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
4		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincereiv.

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

enclosure



#### General Laboratory Report

: 46145 Lab Number

Plant/Generator Name : Pier 91; Project #624878 TASK 7306

: Groundwater; CP-107-0493 and CP-106A-0493 Sample Type

Date of Receipt : 04/08/93
Date of Report : 05/10/93 Analyst: BLW, BB, EL

QC Checked: Matting Mey

Parameters for Analysis: Total and Dissolved Metals

Outside Lab Outside Lab Report No: : None

#### Data:

These two groundwater samples from the Pier 91 Project #624878, Task 7306, sample numbers CP-107-0493 and CP-106A-0493, were analyzed for Total and Dissolved Metals by Methods 7000 and 6010. Copies of the results are attached.

Comments and Conclusions:



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### CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6320

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: 46145 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306
Sample Type : GROUNDWATER
Date of Receipt : 04/08/93 Analyst: BLW, BB, EL.
Date of Report : 04/23/93 QC Checked: 100/04/4/4/7/4/3

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	46145-1 TOTAL	46145-1 DISS.	46145-2 TOTAL	46145-2 DISS.
Metals:	CP-107-0493	CP-107-0493	CP-106A-0493	CP-106A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.010	<0.010	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

#### <u>Comments</u> <u>and</u> <u>Conclusions:</u>

ESULTS ARE REPORTED IN MG/L.

DATES ANALYZED: 4/14/93, 4/20/93, 4/21/93, 4/22/93

: 46145 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/08/93 Analyst: BLW, BB, EL

Date of Report : 04/23/93 QC Checked: MAND DISSOLVED METALS

Parameters for Analysis: TOTAL AND DISSOLVED METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	46145-1MS % RECOVERY	46145-1 MSD % RECOVERY
Metals:		
Silver	93.8	101.6
Arsenic	91.5	91.6
Barium	98.6	96.5
Beryllium	108.0	103.2
Cadmium	106.8	100.8
Chromium	104.4	101.2
Copper	103.0	98.6
Mercury	105.4	109.0
Nickel	104.7	101.3
Lead	91.0	88.5
Selenium	92.6	82.1
Zinc	112.7	105.8

# Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 46145Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/08/93 Analyst: BLW BB ELL

Date of Report : 04/23/93 QC Checked: ACULTOCH STATES

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK MG/L	CONTROL SAMPLE % RECOVERY	% RECOVERY ICV
Silver	<0.010	96.5	
Arsenic	<0.010	87.2	109.2
Barium	<0.20	98.6	The first of the second of the
Beryllium	<0.005	106.0	
Cadmium	<0.005	109.2	
Chromium	<0.010	105.0	
Copper	<0.025	101.2	
Mercury	<0.0002	94.7	94.7
Nickel	<0.040	108.0	
Lead	<0.003	90.5	102.0
Selenium	<0.005	108.3	94.4
Zinc	<0.020	109.8	

# Comments and Conclusions:

RESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 461450

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Outside Lab

Parameters for Analysis: TOTAL AND DISSOLVED METALS

: NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

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### Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.



210 Wost Sand Bank Road P O Box 330 Columbia, IL 62236-0330 618/281-7173

### **CHAIN-OF-CUSTODY RECORD**

C.O.C. SERIAL NO. 6320

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BE-34 (1/92)



### RECEIVED

MAY 1 0 1993

Burlington Environmental Inc.

Technical Services

May 10, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Project: Pier 91 Project #624878. Task #7304

Burlington Environmental Corporate Laboratory Number 46175

Dear Joe:

Six water samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory April 12, 1993. These samples were received in good condition. The samples were analyzed for total and dissolved metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%, except sample 46175-5 which had a TCMX recovery of 35% due to an interfering peak.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
46175-1,2,3,4,5,6, M04123-3, and B04123-3	AAKZ, CAFX, and CAFW	4/12/93	4/13/93, 4/23/93 and 4/27/93

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercurv	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell Perkin Elmer 5100Z Graphite Furnace	
		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps

Laboratory Manager

Burlington Environmental Inc.

enclosure



### General Laboratory Report

Lab Number : 46175

Plant/Generator Name : Pier 91; Project #624878 TASK 7306

Sample Type : Groundwater; CP-106B,-115A,-115B,-915A,-122B,-115M

Date of Receipt : 04/12/93 Analyst: BLW, BB, EL, JB, DW Date of Report : 05/10/93 QC Checked: Kathin May 1

Parameters for Analysis: PCBs, Total and Dissolved Metals

Outside Lab : None Outside Lab Report No:

### Data:

These six groundwater samples from Pier 91 Project #624878, Task 7306, sample numbers CP-106B-0493, CP-115A-0493, CP-115B-0493, CP-915A-0493, CP-122B-0493, CP-115M-0493 were analyzed for PCBs by Method 8080 and for Total and Dissolved Metals by Methods 7000 and 6010. Copies of all results are attached.

Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

### CHAIN-OF-CUSTODY RECORD

6324 C.O.C. SERIAL NO.

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LAB DEST	NOITANI				,	P I A I	1 /	3	770	$\setminus \sigma$					No.	Q /	FORM	I NUMBER	R IF APPLICAT	BLE)
SAMPLE NO.	DATE	TIME	COMOS	Spag	SAMPLE-LOCATION	NO. OF CONTAINERS	0	15 /C				/		\(\frac{\partial}{2}\)		94/				
4675-1	4-9-93	1130		~	CP-104-B.0493	3	1	1	2					V	./					
		1530		V	CP-115A-6493	3		1	2					V	~					
	4-9-93	1500		V	CP-115B-0493	3		1	2			_		~	V					
-4	4-9-93	1530		V	CP-915A-0493	3	1	1	2					~	V_					
-5	4-9-93	1830		/	CP-122B-0493	3	1	1	2			_		~	~					
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Lab Number

: 46175

Plant/Generator Name :

/ PIER 91 Pj# 624878 TASK 7306

: GROUNDWATER

Sample Type

CAFW37

CCV

Date of Receipt

: 04/12/93

Analyst: BLW, BB, EL, JB, DW QC Checked: 45 5/3/97

5.18

Date of Report Outside Lab

: 04/29/93 : NONE

Outside Lab Report No:

1254

Number of Samples

Total PCB Aroclor # Code # Drums Sample ID Run # in Composite (maga) Numbers <0.1ppb B04123-3 BLANK AAKZ43 130% M04123-3 METHOD SPIKE 1248 AAKZ42 <1.0ppb 46175-1 CP-106B-0493 CAFX17 <0.1ppb 46175-2 CP-115A-0493 CAFW28 <1.0ppb 46175-3 CP-115B-0493 CAFX18 CP-915A-0493 <0.1ppb 46175-4 CAFW30 <10ppb 46175-5 CP-122B-0493 CAFX28 <0.1ppb CP-115M-0493 AAKZ39 46175-6 5.56 1254 5 PPM CCV (111% CCV AAKZ41 5.61 1248 AAKZ50 CCV 5 PPM CCV (112% 5.56 1248 5 PPM CCV (111% AAKZ30 CCV 5.04 1248 CCV 5 PPM CCV (101% CAFX15 1248 5.49 5 PPM CCV (110% CCV CAFX26 5.55 1254 CAFX37 CCV 5 PPM CCV (111% 4.60 1260 5 PPM CCV (92%) CCV CAFW26

Instruments: Hewlett Packard 5890 and 5890 Series II G.C.s

5 PPM CCV (104%

Analysts: Al Flores-Serrano and Della Kay Wilson

Lab Number : 46175

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/12/93 Analyst: BLW, BB, EL, JB

Date of Report : 04/22/93 QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS /

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	46175-1 TOTAL	46175-1 DISS.	46175-2 TOTAL	46175-2 DISS.
Metals:	CP-106-B-0493	CP-106-B-0493	CP-115A-0493	CP-115A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	0.019	0.011	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.006	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	<0.020	<0.020	<0.020	<0.020

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L. ATES ANALYZED: 4/15/93, 4/17/93, 4/19/93, 4/20/93 /21/93, 4/22/93.

: 46175 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/12/93 Analyst: BLW BB, EL, JB

Date of Report : 04/22/93 QC Checked: 1/27/14/7 4/77

Parameters for Analysis: TOTAL AND DISSOLVED METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3010, 6010, 7000.

Metals:	46175-3 TOTAL CP-115B-0493	46175-3 DISS. CP-115B-0493	46175-4 TOTAL CP-915A-0493	46175-4 DISS. CP-915A-0493
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	0.040	0.011	0.010	0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	0.040	<0.040	<0.040	<0.040
Lead	0.005	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	0.048	<0.020	<0.020	<0.020

### Comments and Conclusions:

SULTS ARE REPORTED IN MG/L.

Lab Number

: 46175

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

: 04/12/93

Analyst: BLW, BB, EL, JB QC Checked: Houlhon 4 : 04/12/93 Analyst: BLW, : 04/22/93 QC Checked:

Date of Receipt
Date of Report

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

	46175-5 TOTAL	46175-5 DISS.	46175-6 TOTAL CP-115M-0493	46175-6 DISS. CP-115M-0493
Metals:	CP-122B-0493	CP-122B-0493		
Silver	<0.010	<0.010	<0.010	<0.010
Arsenic	<0.010	<0.010	<0.010	<0.010
Barium	<0.20	<0.20	<0.20	<0.20
Beryllium	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	0.033	0.012	<0.010	<0.010
Copper	<0.025	<0.025	<0.025	<0.025
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.040	<0.040	<0.040	<0.040
Lead	<0.003	<0.012	<0.003	<0.003
Selenium	<0.005	<0.005	<0.005	<0.005
Zinc	0.023	<0.020	<0.020	<0.020

## Comments and Conclusions:

ESULTS ARE REPORTED IN MG/L.

: 46175 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/12/93 Analyst: BLW, BB, EL, JB

Date of Report : 04/22/93 QC Checked: JNAUNTAL

Parameters for Analysis: TOTAL AND DISSOLVED METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	46175-6 MS	46175-6 MSD
Metals:	% RECOVERY	% RECOVERY
Silver	103.8	102.6
Arsenic	91.8	92.2
Barium	100.6	101.0
Beryllium	100.4	100.6
Cadmium	102.0	101.2
Chromium	102.2	101.3
Copper	101.4	101.7
Mercury	98.2	101.6
Nickel	102.4	103.0
Lead	99.5	101.5
Selenium	91.3	77.5
Zinc	102.1	102.1

## Comments and Conclusions:

ESULTS ARE REPORTED IN PERCENT RECOVERY.

: 46175Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

: GROUNDWATER Sample Type

Date of Receipt : 04/12/93 Analyst: BLW, BB, JLB, EL Date of Report : 04/22/93 QC Checked: QC Checked:

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3010, 6010, 7000.

	PREPARATION	CONTROL SAMPLE	% RECOVERY
Metals:	BLANK	% RECOVERY	ICV
Silver	<0.010	101.5	
Arsenic	<0.010	97.7	109.2
Barium	<0.20	102.2	
Beryllium	<0.005	101.5	
Cadmium	<0.005	100.4	
Chromium	<0.010	103.6	
Copper	<0.025	104.4	
Mercury	<0.0002	94.8	94.7
Nickel	<0.040	103.6	
Lead	<0.003	104.0	102.0
Selenium	<0.005	95.8	94.4
Zinc	<0.020	101.8	

## Comments and Conclusions:

RESULTS ARE REPORTED IN MG/L AND PERCENT RECOVERY.

Lab Number

: 46175Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type : GROUNDWATER

Date of Receipt : 04/12/93 Analyst: BLW BB, JLB/EL

Date of Report : 04/22/93 QC Checked: 1/20/14/14/15/475

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

	% RECOVERY	2011	CCV	CCV	
Metals:	CCV	CCV			
Silver	103.0	100.5	100.6		
Arsenic	97.0	91.3	94.3		
Barium	101.2	100.5	100.8		
Beryllium	99.9	98.4	98.4		
Cadmium	100.3	100.0	100.2		
Chromium	100.5	98.6	100.5		
Copper	100.3	100.2	100.8		
Mercury	95.9	108.6	98.3		
Nickel	104.8	98.4	104.4		
Lead	99.6	98.8	90.4		
Selenium	93.6	95.6	90.4	95.2	
Zinc	99.2	99.5	99.1		

## Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY.

Lab Number

: 46175Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7306

Sample Type

: GROUNDWATER

Date of Receipt

: 04/12/93 Analyst: BLW BB, JLB/EL : 04/22/93 QC Checked: MANAGE

Date of Report

Parameters for Analysis: TOTAL AND DISSOLVED METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3010, 6010, 7000.

% RECOVERY

Metals:

CCV

Selenium

98.8

Comments and Conclusions:

ESULTS AREA REPORTED IN PERCENT RECOVERY.



210 West Sand Bank Road PO Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

### CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO.

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PROJECT NAME PIEC 9   MAJOR TASK 7306   SAMPLERS L. ROSA, A. Lajor, D. Broten LAB DESTINATION BET	NO. OF CONTAINERS	ANA EOF	Wed 1. 1515	12/4/4/6/2/	10 /00 /00 /00 /00 /00 /00 /00 /00 /00 /	/ / /				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ATIVES	(CHE)	MICAL AN	MARKS IALYSIS RE ER IF APPLI	QUE:	ST E)
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-2 4-9-93 1530 V CP-104-8-0493 -3 4-9-93 1530 V CP-115A-0493 -3 4-9-93 1500 V CP-115B-0493	3		1	2					V V	V	,					
-4 4-9-93 1530 VCP-915A-0493 -5 4-9-93 1830 VCP-122B-0493 -6 4-9-93 1100 VCP-115M-0493	3 3	1	1	2 2 2					\ \ \	\ \ \						
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### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### TRANSMITTAL MEMORANDUM

RECEIVED

MAY 1 4 1993

Burlington Environmental Inc. Technical Services

DATE: May 12, 1993

TO:

David Broten, Burlington Environmental Engineering

PROJECT NAME: Pier 91

PROJECT NUMBER: 624878-7306

LABORATORY NUMBER: 31340

Enclosed are one original and one copy of the Tier II data deliverables package for Laboratory Work Order Number 31340. The samples were received for analysis at Sound Analytical Services, Inc., on April 9, 1993.

If there are any questions regarding this data package, please do not hesitate to call me at (206) 922-2310.

Lide Cf

Sincerely,

Andrew J. Riddell Project Manager

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

May 12, 1993

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7306

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 31340

The samples were taken on 4/08/93 and were received at Sound on 4/09/93. The samples were analyzed for Volatile Organics in accordance with EPA SW-846 Method 8240, Semivolatile Organics in accordance with EPA SW-846 Method 8270, Total Petroleum Hydrocarbons by EPA Method 418.1 modified for soil, and Total Petroleum Fuel Hydrocarbons by EPA Method 8015 modified. One oil sample was qualitatively screened for total petroleum fuel hydrocarbons in accordance with WA State DOE Method WTPH-HCID. The density of the oil sample was determined in accordance with Standard Methods for the Examination of Water and Wastewater (16th Ed.) Method 213 E.

#### VOLATILE ORGANICS

Samples 31340-1 through 31340-3 were analyzed on 4/16/93 and 4/19/93. Methylene chloride was detected in the method blanks at levels above the IDL. Results reported for methylene chloride in the associated samples were flagged B to indicate this. All QC parameters were within acceptance limits.

#### SEMIVOLATILE ORGANICS

Samples 31340-1 and 31340-2 were extracted on 4/15/93 and analyzed on 4/16/93. No compounds were detected in the method blank above the IDL. All QC parameters were within acceptance limits.

#### TOTAL PETROLEUM FUEL HYDROCARBONS

Samples 31340-1 and 31340-2 were extracted on 4/12/93 and analyzed on 4/13/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

#### TOTAL PETROLEUM HYDROCARBONS

Samples 31340-1 and 31340-2 were extracted on 4/12/93 and analyzed on 4/13/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

#### HYDROCARBON IDENTIFICATION

Sample 31340-1 was extracted on 4/16/93 and analyzed on 4/20/93. No contamination above the PQL was present in the method blank.

#### SPECIFIC GRAVITY

The specific gravity for sample 31340-1 was determined on 4/13/93.

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental, Date: April 23, 1993

Technical Services

Report On: Analysis of Oil & Water

Lab No.: 31340

Page 1 of 15

IDENTIFICATION:

Samples received on 04-09-93 Project: 624878-7306 Pier 91

#### ANALYSIS:

Lab Sample No. 31340-1

Client ID: CP-107-0493

Volatile Organics by Method 8240 Date Analyzed: 4-19-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane	ND	20	
Bromomethane	ND	20	3
Vinyl Chloride	ND	20	
Chloroethane	. 55	20	
Methylene Chloride	42	10	B1
Acetone	11	100	J
Carbon Disulfide	ND	10	
1,1-Dichloroethene	ND	10	
1,1-Dichloroethane	2.6	10	J
1,2-Dichloroethene (Total)	ND	10	-
Chloroform	ND	10	
1,2-Dichloroethane	ND	10	
2-Butanone	ND	50	
1,1,1-Trichloroethane	ND	10	
Carbon Tetrachloride	ND	10	
Vinyl Acetate	ND	50	
Bromodichloromethane	ND	10	
1,2-Dichloropropane	ND	10	
Cis-1,3-Dichloropropene	ND	10	
Trichloroethene	ND	10	
Dibromochloromethane	ND	10	
1,1,2-Trichloroethane	ND ·	10	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 2 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

8240 Continued . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	10 10 10 50 10 10 10 10 10 10	J

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	103	88 - 110	81 - 117
	86	86 - 115	74 - 121
	110	76 - 114	70 - 121

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 3 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

			4
Compound	Concentration ug/L	PQL	Flag
Phenol bis(2-Chloroethyl) ether	ND ND	9.9	
2-Chlorophenol 1,3-Dichlorobenzene	ND ND	9.9 9.9	
1,4-Dichlorobenzene	ND	9.9	
Benzyl Alcohol	ND ND	20 9.9	
1,2-Dichlorobenzene 2-Methylphenol	ND	9.9	
bis(2-Chloroisopropyl)ether	ND	9.9	
4-Methylphenol N-Nitroso-Di-N-propylamine	ND ND	9.9	
Hexachloroethane	ND	9.9	
Nitrobenzene	ND	9.9	
Isophorone 2-Nitrophenol	ND ND	9.9	
2,4-Dimethylphenol	ND	9.9	155
Benzoic Acid	, ND	50	
bis(2-Chloroethoxy)methane 2,4-Dichlorophenol	ND ND	9.9	
1,2,4-Trichlorobenzene	ND	9.9	
Naphthalene	ND	9.9	
4-Chloroaniline Hexachlorobutadiene	ND ND	9.9	
4-Chloro-3-methylphenol	ND	20	

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. TO THE SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 4 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

#### EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	3.6	9.9	J
Hexachlorocyclopentadiene	ND	9.9	11
2,4,6-Trichlorophenol	ND	9.9	0 00 0
2,4,5-Trichlorophenol	ND	9.9	0.0
2-Chloronaphthalene	ND	9.9	
2-Nitroaniline	ND	50	9
Dimethyl phthalate	ND	9.9	
Acenaphthylene	ND	9.9	
2,6-Dinitrotoluene	ND	9.9	
3-Nitroaniline	ND	50	
Acenaphthene	4.0	9.9	J
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	1.8	9.9	J
2,4-Dinitrotoluene	ND	9.9	
Diethylphthalate	ND	9.9	
4-Chlorophenyl phenyl ether	ND	9.9	
Fluorene	7.6	9.9	J
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	, ND	9.9	
4-Bromophenyl phenyl ether	ND	9.9	
Hexachlorobenzene	ND	9.9	
Pentachlorophenol	ND	50	
Phenanthrene	3.4	9.9	J
Anthracene	ND	9.9	
Di-n-butylphthalate	6.0	9.9	J

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 5 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	9.9 9.9 9.9 9.9 9.9 9.9 9.9 9.9 9.9	

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	69	35 - 114	23 - 120
	64	43 - 116	30 - 115
	74	33 - 141	18 - 137
	24	10 - 94	24 - 113
	47	21 - 100	25 - 121
	86	10 - 123	19 - 122

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 6 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

TPH Per EPA Method 418.1 Date Extracted: 4-12-93 Date Analyzed: 4-13-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum
Hydrocarbons 3.5 1.0

TPH Per EPA SW-846 Modified Method 8015 Date Extracted: 4-12-93 Date Analyzed: 4-14-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum
Fuel Hydrocarbons, mg/L ND 0.75

SURROGATE RECOVERY, %
1-chlorooctane 87
o-terphenyl 98

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 7 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-1

Client ID: CP-107-0493

X10

Matrix: Oil

o-terphenyl

WTPH-HCID

Date Extracted: 4-16-93 Date Analyzed: 4-20-93

Parameters	Concentration, mg/kg	Flag
Gasoline (C7-C12)	> 20	
Diesel (> C12 - C24)	> 50	
Heavy Oil	< 100	
SURROGATE RECOVERY, %		
1-chlorooctane		X10

ND - Not Detected PQL - Practical Quantitation Limit

<u>Parameter</u>	Result
Specific Gravity	0.866

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 8 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

Volatile Organics by Method 8240 Date Analyzed: 4-19-93

· · · · · · · · · · · · · · · · · · ·	1		
Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane	ND ND	20 20	
Vinyl Chloride	ND	20	
Chloroethane	ND 24	20 10	B1
Methylene Chloride	ND ND	100	B1
Carbon Disulfide	ND	10	
1,1-Dichloroethene	ND	10	
1,1-Dichloroethane	ND	10	
1,2-Dichloroethene (Total)	ND	10	
Chloroform	ND ND	10	
1,2-Dichloroethane 2-Butanone	ND ND	50	
1,1,1-Trichloroethane	ND	10	
Carbon Tetrachloride	ND	10	
Vinyl Acetate	ND	50	
Bromodichloromethane	ND	10	
1,2-Dichloropropane	ND	10	
Cis-1,3-Dichloropropene	ND	10	_
Trichloroethene	1.8	10	J
Dibromochloromethane	ND ND	10	
1,1,2-Trichloroethane	עאו	10	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 9 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

8240 Continued . . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	10 10 10 50 10 10 10 10 10 10	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	104	88 - 110	81 - 117
	90	86 - 115	74 - 121
	106	76 - 114	70 - 121

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 10 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93
Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol bis(2-Chloroethyl) ether 2-Chlorophenol 1,3-Dichlorobenzene 1,4-Dichlorobenzene Benzyl Alcohol 1,2-Dichlorobenzene 2-Methylphenol bis(2-Chloroisopropyl)ether 4-Methylphenol N-Nitroso-Di-N-propylamine Hexachloroethane Nitrobenzene Isophorone 2-Nitrophenol 2,4-Dimethylphenol Benzoic Acid bis(2-Chloroethoxy)methane 2,4-Dichlorophenol 1,2,4-Trichlorobenzene Naphthalene 4-Chloroaniline Hexachlorobutadiene 4-Chloro-3-methylphenol	ND N	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	

ND - Not Detected POL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 11 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	9.8	
Hexachlorocyclopentadiene	ND	9.8	
2,4,6-Trichlorophenol	ND	9.8	
2,4,5-Trichlorophenol	ND	9.8	
2-Chloronaphthalene	ND	9.8	
2-Nitroaniline	ND	49	
Dimethyl phthalate	ND	9.8	
Acenaphthylene	ND	9.8	
2,6-Dinitrotoluene	ND .	9.8	
3-Nitroaniline	ND	49	
Acenaphthene	ND	9.8	
2,4-Dinitrophenol	ND	49	
4-Nitrophenol	ND	49	
Dibenzofuran	ND	9.8	
2,4-Dinitrotoluene	ND	9.8	
Diethylphthalate	ND	9.8	l a
4-Chlorophenyl phenyl ether	ND	9.8	
Fluorene	ND.	9.8	
4-Nitroaniline	ND	49	
4,6-Dinitro-2-methylphenol	ND	49	
N-Nitrosodiphenylamine	ND	9.8	
4-Bromophenyl phenyl ether	ND	9.8	
Hexachlorobenzene	ND	9.8	-
Pentachlorophenol	ND	49	
Phenanthrene	ND	9.8	
Anthracene	ND	9.8	
Di-n-butylphthalate	4.2	9.8	J

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. 1964 C. INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 12 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

EPA Method 8270 Continued				
Compound	Concentration ug/L	PQL	Flag	
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	J	

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	70	35 - 114	23 - 120
	60	43 - 116	30 - 115
	73	33 - 141	18 - 137
	23	10 - 94	24 - 113
	48	21 - 100	25 - 121
	79	10 - 123	19 - 122

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 13 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-2

Client ID: CP-106A-0493

TPH Per EPA Method 418.1 Date Extracted: 4-12-93 Date Analyzed: 4-13-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum Hydrocarbons

1.8

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-12-93 Date Analyzed: 4-14-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum

Fuel Hydrocarbons, mg/L ND 0.75

SURROGATE RECOVERY, %

1-chlorooctane 70 o-terphenyl 101

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 14 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-3

Client ID: Trip Blank #4

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane	ND	20	
Bromomethane	ND	20	
Vinyl Chloride	ND	20	
Chloroethane	ND	20	
Methylene Chloride	17	10	B1
Acetone	ND	100	
Carbon Disulfide	ND	10	10.70
1,1-Dichloroethene	ND	10	
1,1-Dichloroethane	ND	10	
1,2-Dichloroethene (Total)	ND	10	
Chloroform	ND	10	
1,2-Dichloroethane	ND	10	
2-Butanone	ND	50	
1,1,1-Trichloroethane	ND	10	
Carbon Tetrachloride	ND	10	
Vinyl Acetate	ND	50	
Bromodichloromethane	ND	10	
1,2-Dichloropropane	ND	10	
Cis-1,3-Dichloropropene	ND	10	
Trichloroethene	ND	10	1 4
Dibromochloromethane	ND	10	
1,1,2-Trichloroethane	ND	10	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 15 of 15 Lab No. 31340 April 22, 1993

Lab Sample No. 31340-3

Client ID: Trip Blank #4

8240 Continued .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	10 10 10 50 10 10 10 10 10 10	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	105	88 - 110	81 - 117
	91	86 - 115	74 - 121
	104	76 - 114	70 - 121

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

### Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc7

Units:

ug/L

Date:

April 22, 1993

Blank No: V9958

METHOD BLANK

Compound	Result	PQL	Flags
Chloromethane	ND	10	
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	4.2	5	J
Acetone	ND	50	
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND	5	
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5	
Chloroform	ND	5 5 5	
1,2-Dichloroethane	ND		
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	. 5	
1,2-Dichloropropane	ND		
Cis-1,3-Dichloropropene	ND	5	
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	·c
1,1,2-Trichloroethane	ND	5	
Benzene	ND	5	
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5 5 5 5 5 5 5 5 5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5	
Toluene	ND	5 5 5	
Chlorobenzene	ND	5	
Ethyl Benzene	ND	5	
Styrene	ND	5	
Total Xylenes	ND	5	
Total Aylenes	I III	1	

ND - Not Detected

PQL - Practical Quantitation Limit

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Client: Burlington Environmental, Technical Services

Lab No:

31340qc7

Date:

April 22, 1993

Blank No: V9958

WOT AMITE CUIDDOCATES

Surrogate	Percent Recovery	Contro	l Limits Soil
Toluene - d8 Bromofluorobenzene 1,2-Dichloroethane d4	102	86 - 115	81 - 117
	87	76 - 114	74 - 121
	103	88 - 110	70 - 121

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS PER EPA METHOD 8240

### Page 1 of 2

Client: Burlington Environmental, Technical Services

METHOD BLANK

Result

POL

Flags

Lab No: 31340qc8

Units: ug/L

Date: April 22, 1993

Blank No: V9909

Compound

- 2				
	Chloromethane	ND	10	
	Bromomethane	ND	10	
	Vinyl Chloride	ND	10	
	Chloroethane	ND	10	
	Methylene Chloride	5.3	5	
	Acetone	ND	50	
	Carbon Disulfide	ND	5	

-1	Methylene Chiofide	2.2	5	1
1	Acetone	ND	50	
1	Carbon Disulfide	ND	5	
	1,1-Dichloroethene	ND	5	2 1
	1,1-Dichloroethane	ND	5	
	1,2-Dichloroethene (Total)	ND	5	
	Chloroform	ND	5	
	1,2-Dichloroethane	ND	5	
	2-Butanone	ND	25	
	1,1,1-Trichloroethane	ND	5	
	Carbon Tetrachloride	ND	5	
	Vinyl Acetate	ND	25	
	Bromodichloromethane	ND	5	
	1,2-Dichloropropane	ND	5	
	Cis-1,3-Dichloropropene	ND ND	5	
	Trichloroethene	ND	5	
	Dibromochloromethane	, ND	5	
	1,1,2-Trichloroethane	ND	5	
	Benzene	ND	5	
	Trans-1,3-Dichloropropene	ND	5	
	Bromoform	ND	5	
	4-Methyl-2-Pentanone	ND	25	
	2-Hexanone	ND	5	
	Tetrachloroethene	ND	5	
	1,1,2,2-Tetrachloroethane	ND	5	
	Toluene	ND	5	
	Chlorobenzene	ND	5	
	Ethyl Benzene	ND	5	,
	Styrene	ND	5	
			_	1

ND

ND - Not Detected

Total Xylenes

PQL - Practical Quantitation Limit

### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc8

Date:

April 22, 1993

Blank No: V9909

VOLATILE SURROGATES

Surrogate	Percent Recovery	Contro	l Limits Soil
Toluene - d8	106	86 - 115	81 - 117
Bromofluorobenzene	86	76 - 114	74 - 121
1,2-Dichloroethane d4	101	88 - 110	70 - 121

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

### VOLATILE ORGANICS - METHOD 8240

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc9

Units:

ug/L

Date:

April 22, 1993

#### BLANK SPIKE RECOVERY

Date Analyzed: 4-16-93

		Duc	e Allaly2					
Parameter	Blank Spike Result (BS)	Spike Added (SA)	%R	Blank Spike Dup Result (BSD)	Spike Added (SA)	%R	RPD	Flag
1,1-DCE	48	50	96	49	50	98	4.1	
TCE	47	50	94	48	50	96	2.1	
Chloro- benzene	48	50	96	49	50	98	2.1	,
Toluene	50	50	100	50	50	100	0.0	
Benzene	47	50	94	49	50	98	4.2	

%R = Percent Recovery

 $= [(BS / SA] \times 100$ 

RPD = Relative Percent Difference

 $= [(BS - BSD) / ((BS + BSD) / 2] \times 100$ 

RPD	% RECOVERY
22	59 - 172
24	62 - 137
21	60 - 133
21	59 - 139
21	66 - 142
	22 24 21 21

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

### VOLATILE ORGANICS - METHOD 8240

Client: Burlington Environmental, Technical Services

Lab No: 31340q10

Units:

ug/L

Date:

April 22, 1993

#### BLANK SPIKE RECOVERY

Date Analyzed: 4-19-93

Parameter	Blank Spike Result (BS)	Spike Added (SA)	e Analyz	Blank Spike Dup Result (BSD)	Spike	%R	RPD	Flag
1,1-DCE	52	50	104	53	50	106	1.9	
TCE	50	50	100	55	50	110	9.5	7,7
Chloro- benzene	51	50	102	54	50	108	5.7	
Toluene	54	50	108	59	50	118	8.8	
Benzene	50	50	100	54	50	108	7.7	(a) (b)

%R = Percent Recovery

 $= [(BS / SA] \times 100]$ 

RPD = Relative Percent Difference

 $= [(BS - BSD) / ((BS + BSD) / 2] \times 100$ 

ADVISORY LIMITS	RPD	<pre>% RECOVERY</pre>
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

## SEMIVOLATILE ORGANICS PER EPA METHOD 8270

### Page 1 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc5

Units:

ug/L

Date:

April 22, 1993 Blank No: SBLK89-S8428

METHOD BLANK

Compound	Result	PQL	Flags
Phenol bis(2-Chloroethyl) ether 2-Chlorophenol 1,3-Dichlorobenzene 1,4-Dichlorobenzene Benzyl Alcohol 1,2-Dichlorobenzene 2-Methylphenol bis(2-Chloroisopropyl)ether 4-Methylphenol N-Nitroso-Di-N-propylamine Hexachloroethane Nitrobenzene Isophorone 2-Nitrophenol 2,4-Dimethylphenol Benzoic Acid bis(2-Chloroethoxy)methane 2,4-Dichlorophenol 1,2,4-Trichlorobenzene Naphthalene 4-Chloroaniline Hexachlorobutadiene 4-Chloro-3-methylphenol 2-Methylnaphthalene Hexachlorocyclopentadiene 2,4,6-Trichlorophenol	ND ND ND ND ND ND ND ND ND	10 10 10 10 10 10 10 10 10 10 10 10 10 1	Flags
2,4,5-Trichlorophenol 2-Chloronaphthalene 2-Nitroaniline Dimethyl phthalate Acenaphthylene	ND ND ND ND ND	10 10 50 10	

PQL - Practical Quantitation Limit

ND - Not Detected

# SOUND ANALYTICAL SERVICES, INC. STREET INC.

### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 2 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc5

Units:

ug/L

Date:

April 22, 1993

Blank No: SBLK89-S8428

|--|

Compound	Result	PQL	Flags
3-Nitroaniline	ND	50	
Acenaphthene	ND	10	
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	ND	10	
2,4-Dinitrotoluene	ND	10	
2,6-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	1.00000000	10	
Fluorene	ND	10	
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	ND	10	
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	50	
Phenanthrene	ND	10	
Anthracene	ND	10	
Di-n-butylphthalate	ND	10	
Fluoranthene	ND	10	
Pyrene	ND	10	
Butyl benzyl phthalate	ND	10	(4)
3,3'-Dichlorobenzidine	ND	20	
Benzo(a)anthracene	ND	10	
bis(2-ethylhexyl)phthalate	ND	10	
Chrysene	ND	10	
Di-n-octyl phthalate	ND	10	
Benzo(b) fluoranthene	ND	10	*
Benzo(k)fluoranthene	ND	10	-
1 .	ND	10	
Benzo(a)pyrene	ND	10	_
Indeno(1,2,3-cd)pyrene	ND ND	10	
Dibenz(a,h)anthracene	ND ND	10	
Benzo(g,h,i)perylene	ND	10	

PQL - Practical Quantitation Limit

ND - Not Detected

# SOUND ANALYTICAL SERVICES, INC. SHEVELEN

### QUALITY CONTROL REPORT

#### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 3 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc5

April 22, 1993 Date: Blank No: SBLK89-S8428

	SEMIVOI	LATILE SURROGA!	LED
Surrogate	Percent	Control	Limits
	Recovery	Water	Soil
Nitrobenzene - d5	76	35 - 114	23 - 120
2-Fluorobiphenyl	62	43 - 116	30 - 115
p-Terphenyl-d14	73	33 - 141	18 - 137
Phenol-d6	27	10 - 94	24 - 113
2-Fluorophenol	52	21 - 100	25 - 121
2,4,6-TBP	72	10 - 123	19 - 122

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

## WATER MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name:

Burlington Environmental, Technical Services

Lab No:

31340qc6

Date:

April 22, 1993

SEMI-VOLATILE ORGANICS							
SPIKE (ug/L)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS
100	ND	25.0	25.0	24.6	24.6	1.6	
100	ND	57.8	57.8	59.2	59.2	2.4	
100	ND	55.1	55.1	50.7	50.7	8.3	v'
100	ND	63.1	63.1	62.5	62.5	1.0	
100	ND	61.5	61.5	57.3	57.3	7.1	
100	ND	56.5	56.5	58.2	58.2	3.0	
100	ND	58.4	58.4	56.6	56.6	3.1	,
100	ND	20.6	20.6	21.2	21.2	2.9	
100	ND	62.7	62.7	61.2	61.2	2.4	
100	ND	42.5	42.5	49.5	49.5	15.0	1 11
100	ND	72.6	72.6	74.9	74.9	3.1	
	SPIKE (ug/L)  100  100  100  100  100  100  100  1	SPIKE (ug/L)         SAMPLE RESULT           100         ND           100         ND	SPIKE (ug/L)         SAMPLE RESULT         CONC MS           100         ND         25.0           100         ND         57.8           100         ND         55.1           100         ND         63.1           100         ND         61.5           100         ND         56.5           100         ND         58.4           100         ND         62.7           100         ND         42.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC           100         ND         25.0         25.0           100         ND         57.8         57.8           100         ND         55.1         55.1           100         ND         63.1         63.1           100         ND         61.5         61.5           100         ND         56.5         56.5           100         ND         58.4         58.4           100         ND         20.6         20.6           100         ND         62.7         62.7           100         ND         42.5         42.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC         CONC MSD           100         ND         25.0         25.0         24.6           100         ND         57.8         57.8         59.2           100         ND         55.1         55.1         50.7           100         ND         63.1         63.1         62.5           100         ND         61.5         57.3           100         ND         56.5         56.5         58.2           100         ND         58.4         56.6           100         ND         20.6         20.6         21.2           100         ND         62.7         62.7         61.2           100         ND         42.5         42.5         49.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC         CONC MSD         % REC           100         ND         25.0         25.0         24.6         24.6           100         ND         57.8         57.8         59.2         59.2           100         ND         55.1         55.1         50.7         50.7           100         ND         63.1         63.1         62.5         62.5           100         ND         56.5         56.5         57.3         57.3           100         ND         58.4         56.5         58.2         58.2           100         ND         20.6         20.6         21.2         21.2           100         ND         62.7         62.7         61.2         61.2           100         ND         62.7         62.7         61.2         61.2           100         ND         42.5         49.5         49.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC         CONC MSD         % REC         RPD           100         ND         25.0         25.0         24.6         24.6         1.6           100         ND         57.8         57.8         59.2         59.2         2.4           100         ND         55.1         55.1         50.7         50.7         8.3           100         ND         63.1         63.1         62.5         62.5         1.0           100         ND         61.5         57.3         57.3         7.1           100         ND         56.5         56.5         58.2         58.2         3.0           100         ND         58.4         56.6         56.6         3.1           100         ND         20.6         20.6         21.2         21.2         2.9           100         ND         62.7         62.7         61.2         61.2         2.4           100         ND         42.5         42.5         49.5         49.5         15.0

RPD = Relative Percent Difference

<sup>%</sup> REC = Percent Recovery

ADVISORY LIMITS:	RPD	<u>% F</u>	RECOVERY
Phenol 2-Chlorophenol 1,4-Dichlorobenzene	42 40 28	12 27 36	- 89 - 123 - 97
N-nitrosodi-n- Propylamine	38	41	- 116
1,2,4-Trichlorobenzene	28	39	- 98
1-Chloro-3-Methylphenol	42	23	- 97
Acenaphthene	31	46	- 118
1-Nitrophenol	50	10	- 80
2,4 Dinitrotoluene	38	24	- 96
Pentachlorophenol	50	9	- 103
Pyrene	31	26	- 127
<b>▲</b> ************************************			

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons by Method 8015

Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc2

Matrix:

Water

Units: Date: mg/L April 22, 1993

#### DUPLICATE

Dup. No. 31340-1					
Parameter	Sample (S)	Duplicate (D)	RPD	PQL	Flags
Total Petroleum Fuel Hydrocarbons	ND	ND	0.0	0.75	
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	87 98	83 100			

RPD = relative percent difference =  $[(S - D) / ((S + D) / 2)] \times 100$ 

## MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MS/MSD No. 31340-1						
Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	RPD
Total Petroleum Fuel Hydrocarbons	ND	327	402	81	326	0.3

## SOUND ANALYTICAL SERVICES, INC. SERVICES, I

### QUALITY CONTROL REPORT

## Total Petroleum Fuel Hydrocarbons by Method 8015

Page 2 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc2

Units:

mg/L

Date:

April 22, 1993

## BLANK SPIKE RECOVERY

BS No. 032.R0101.D			
Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	406	101

%R = Percent Recovery
= [(BS - SR) / SA] x 100

#### METHOD BLANK

Blank No. 011R0101.D		
Parameter	Result	PQL
Total Petroleum Fuel Hydrocarbons	ND	0.75
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	96 111	

ND - Not Detected PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. STATICES, I

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### QUALITY CONTROL REPORT

#### WTPH-HCID

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc1

Units:

mg/kg

Date:

April 22, 1993

#### METHOD BLANK

Blank No. 003F0101.D

Brank No. 00310101.D		
Parameter	Result	Flags
Gasoline (C <sub>7</sub> -C <sub>12</sub> )	< 20	
Diesel (>C <sub>12</sub> -C <sub>24</sub> )	< 50	a .
Heavy Petroleum Oil	< 100	
SURROGATE RECOVERY, % 1-chlorooctane o-terphenyl	95 92	

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### QUALITY CONTROL REPORT

TPH by Method 418.1

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc3

Matrix:

Water

Units: Date: mg/L April 22, 1993

METHOD BLANK

	METHOD BLANK	
Parameter	Result	PQL
Total Petroleum Hydrocarbons	ND	1.0

ND - Not Detected

PQL - Practical Quantitation Limit

BLANK SPIKE RECOVERY

Parameter	Blank Spike Result (BS)	Spike Added (SA)	%R	Blank Spike Dup Result (BSD)	Spike Added (SA)	%R	RPD	Flag
Total Petroleum Hydrocarbons	70	100	70	84	100	84	18	

%R = Percent Recovery

 $= [(BS / SA] \times 100$ 

RPD = Relative Percent Difference

 $= [(BS - BSD) / ((BS + BSD) / 2] \times 100$ 

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

### Specific Gravity

Client:

Burlington Environmental, Technical Services

Lab No:

31340qc4

Date:

April 22, 1993

#### DUPLICATE

Dup No. 31340-1		-	*
Parameter	Sample(S)	Duplicate(D)	RPD
Specific Gravity	0.8659	0.8653	0.07

RPD = Relative Percent Difference =  $[(S - D) / ((S + D) / 2)] \times 100$ 

#### CHECK STANDARD

Environmental Resea	rch Associates		+
Parameter	Result (R)	True Value (TV)	% D
Specific Gravity	0.9996	1.0000	0.04

% D = % Difference= TV - R / TV x 100

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### DATA QUALIFIER FLAGS

Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation ND: limit, corrected for sample dilution. The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity. J: The identification of this analyte was confirmed by GC/MS. C: This analyte was also detected in the associated method blank. The reported sample results have been adjusted for moisture, B1: final exract volume, and/or dilutions performed during extract preparation. The analyte concentration was evaluated prior to sample preparation adjustments, and was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank). This analyte was also detected in the associated method blank. However, the analyte concentration in the sample was B2: determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank). The concentration of this analyte exceeded the instrument calibration range. E: The reported result for this analyte is calculated based on a secondary dilution factor. D: This TIC is a suspected aldol-condensation product. A: Quantitation Limits are elevated due to matrix interferences. M: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an S: estimated quantity. Contaminant does not appear to be "typical" product. Elution pattern suggests it may be X1: Contaminant does not appear to be "typical" product. Further testing is suggested for identification. X2: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended. X3: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous. X4: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit. X4a: Matrix spike was diluted out during analysis. X5: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results. X6: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data. X7: RPD value for MS/MSD outside QC limits due to high contaminant levels. X7a: X8: Surrogate was diluted out during analysis. Surrogate recovery outside QC limits due to matrix composition. X9: Surrogate recovery outside QC limits due to high contaminant levels. X10:

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-5120 FAX

## **CHAIN-OF-CUSTODY RECORD**

c.o.c. serial no. 6322

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#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### TRANSMITTAL MEMORANDUM

RECEIVED

MAY 1 7 1993

Burlington Environmental Inc. Technical Services

DATE: May 13, 1993

TO:

David Broten, Burlington Environmental Engineering

PROJECT NAME: Pier 91

PROJECT NUMBER: 624878-7306

LABORATORY NUMBER: 31367

Enclosed are one original and one copy of the Tier II data deliverables package for Laboratory Work Order Number 31367. The samples were received for analysis at Sound Analytical Services, Inc., on April 12, 1993.

If there are any questions regarding this data package, please do not hesitate to call me at (206) 922-2310.

Fishelf

Sincerely,

Andrew J. Riddell Project Manager

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

May 13, 1993

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7306

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 31367

The samples were taken on 4/09/93 and were received at Sound on 4/12/93. The samples were analyzed for Volatile Organics in accordance with EPA SW-846 Method 8240, Semivolatile Organics in accordance with EPA SW-846 Method 8270, Total Petroleum Hydrocarbons by EPA Method 418.1 modified for soil, and Total Petroleum Fuel Hydrocarbons by EPA Method 8015 modified.

#### VOLATILE ORGANICS

Samples 31367-1 through 31367-7 were analyzed on 4/16/93. Methylene chloride was detected in the method blank at a level above the IDL. Results reported for this compound in the associated samples were flagged B to indicate this. All QC parameters were within acceptance limits.

### SEMIVOLATILE ORGANICS

Samples 31367-1 through 31367-6 were extracted on 4/15/93 and analyzed on 4/15/93 and 4/16/93. No compounds were detected in the method blank above the IDL. All QC parameters were within acceptance limits.

#### TOTAL PETROLEUM FUEL HYDROCARBONS

Samples 31367-1 through 31367-6 were extracted and analyzed on 4/15/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

### TOTAL PETROLEUM HYDROCARBONS

Samples 31367-1 through 31367-6 were extracted on 4/14/93 and analyzed on 4/15/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental, Date: April 20, 1993

Technical Services

Lab No.: 31367

Page 1 of 38

Report On: Analysis of Water

IDENTIFICATION:

Samples received on 04-12-93 Project: 624878-7306 Pier 91

Project: 024070 7300 Fiel 31

#### ANALYSIS:

Lab Sample No. 31367-1

Client ID: CP-115M-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene 1,1-Dichloroethane 1,2-Dichloroethene (Total) Chloroform 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND ND O.43 ND	10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5	B1

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91

Page 2 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-1

Client ID: CP-115M-0493

8240 Continued . .

Concentration   ug/L   PQL   Flag	6240 Continued			
Trans-1,3-Dichloropropene ND 5 Bromoform ND 5 4-Methyl-2-Pentanone ND 25 2-Hexanone ND 5 Tetrachloroethene ND 5 1,1,2,2-Tetrachloroethane ND 5 Toluene ND 5 Chlorobenzene ND 5 Ethyl Benzene ND 5 Styrene	Compound		PQL	Flag
	Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene	ND	5 5 25 5 5 5 5 5 5 5 5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	100	88 - 110	81 - 117
	87	86 - 115	74 - 121
	105	76 - 114	70 - 121

## SOUND ANALYTICAL SERVICES, INC. PROVICES, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 3 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-1

Client ID: CP-115M-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-15-93

Compound	Concentration ug/L	PQL	Flag
Phenol	ND	9.6	
bis(2-Chloroethyl) ether	ND	9.6	
2-Chlorophenol	ND	9.6	
1,3-Dichlorobenzene	ND	9.6	2 111
1,4-Dichlorobenzene	ND	9.6	
Benzyl Alcohol	ND	19	
1,2-Dichlorobenzene	ND	9.6	
2-Methylphenol	ND	9.6	
bis(2-Chloroisopropyl)ether	ND	9.6	
4-Methylphenol	ND	9.6	
N-Nitroso-Di-N-propylamine	ND	9.6	
Hexachloroethane	ND	9.6	
Nitrobenzene	ND	9.6	
Isophorone	ND	9.6	
2-Nitrophenol	ND	9.6	
2,4-Dimethylphenol	ND	9.6	
Benzoic Acid	ND	48	
bis(2-Chloroethoxy)methane	ND	9.6	
2,4-Dichlorophenol	ND	9.6	
1,2,4-Trichlorobenzene	ND	9.6	
Naphthalene	ND	9.6	
4-Chloroaniline	ND	19	
4 Chiologhilline			
Hexachlorobutadiene	ND	9.6	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 4 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-1

Client ID: CP-115M-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	9.6	
Hexachlorocyclopentadiene	ND	9.6	
2,4,6-Trichlorophenol	ND	9.6	
2,4,5-Trichlorophenol	ND	9.6	l in
2-Chloronaphthalene	ND	9.6	
2-Nitroaniline	ND	48	
Dimethyl phthalate	ND	9.6	
Acenaphthylene	ND	9.6	
2,6-Dinitrotoluene	ND	9.6	
3-Nitroaniline	ND	48	
Acenaphthene	ND	9.6	
2,4-Dinitrophenol	ND	48	
4-Nitrophenol	ND	48	Tati
Dibenzofuran	ND	9.6	
2,4-Dinitrotoluene	ND	9.6	
Diethylphthalate	ND	9.6	
4-Chlorophenyl phenyl ether	ND	9.6	
Fluorene	ND	9.6	
4-Nitroaniline	ND	48	
4,6-Dinitro-2-methylphenol	ND	48	
N-Nitrosodiphenylamine	ND	9.6	
4-Bromophenyl phenyl ether	ND	9.6	
Hexachlorobenzene	ND	9.6	
Pentachlorophenol	ND	48	
Phenanthrene	ND	9.6	
Anthracene	ND	9.6	
Di-n-butylphthalate	ND	9.6	

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. SERVICES, I

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 5 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-1

Client ID: CP-115M-0493

EPA Method 8270 Continued			
Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6	

ND - Not Detected PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	70	35 - 114	23 - 120
	57	43 - 116	30 - 115
	71	33 - 141	18 - 137
	24	10 - 94	24 - 113
	46	21 - 100	25 - 121
	72	10 - 123	19 - 122

# SOUND ANALYTICAL SERVICES, INC. ERVICES, IN

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 6 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-1

Client ID: CP-115M-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter Concentration, mq/L PQL Flag Total Petroleum Hydrocarbons ND 1.0

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93 Date Analyzed: 4-15-93

Parameter Concentration, mq/L PQL Flag Total Petroleum Fuel Hydrocarbons ND 0.75

SURROGATE RECOVERY, % 1-chlorooctane 114 o-terphenyl 119

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 7 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-2

Client ID: CP-106B-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene 1,2-Dichloroethene 1,2-Dichloroethene (Total) Chloroform 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND ND S4 2.3 ND	20 20 20 20 10 10 10 10 10 10 10 10 10 10 10 10 10	B1 J

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 8 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-2

Client ID: CP-106B-0493

8240 Continued . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene	ND	10 10 10 50 10 10 10 10	
Ethyl Benzene Styrene Total Xylenes	ND ND	10 10 10	,

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control Limits	
Compound	Recovery	Water Soil	
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	103	88 - 110	81 - 117
	91	86 - 115	74 - 121
	103	76 - 114	70 - 121

# SOUND ANALYTICAL SERVICES, INC. STRVICES, I

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-2

Client ID: CP-106B-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol bis(2-Chloroethyl) ether 2-Chlorophenol 1,3-Dichlorobenzene 1,4-Dichlorobenzene Benzyl Alcohol 1,2-Dichlorobenzene 2-Methylphenol bis(2-Chloroisopropyl)ether 4-Methylphenol N-Nitroso-Di-N-propylamine Hexachloroethane Nitrobenzene Isophorone 2-Nitrophenol 2,4-Dimethylphenol Benzoic Acid		10 10 10 10 10 20 10 10 10 10 10 10 10 10	Flag
bis(2-Chloroethoxy)methane 2,4-Dichlorophenol 1,2,4-Trichlorobenzene Naphthalene 4-Chloroaniline Hexachlorobutadiene 4-Chloro-3-methylphenol	ND ND ND ND ND ND	10 10 10 10 20 10 20	

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. SERVICES, IN

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-2

Client ID: CP-106B-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	10	
Hexachlorocyclopentadiene	ND	10	1 10 * 1
2,4,6-Trichlorophenol	ND	10	
2,4,5-Trichlorophenol	ND	10	
2-Chloronaphthalene	ND	10	
2-Nitroaniline	ND	50	
Dimethyl phthalate	ND	10	
Acenaphthylene	ND	10	
2,6-Dinitrotoluene	ND	10	
3-Nitroaniline	ND	50	
Acenaphthene	ND	10	
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	ND	10	
2,4-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	ND	10	
Fluorene	ND	10	
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	ND	10	
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	50	
Phenanthrene	ND	10	
Anthracene	ND	10	
Di-n-butylphthalate	ND	10	

ND - Not Detected

PQL - Practical Quantitation Limit

## SOUND ANALYTICAL SERVICES, INC. ERVICES, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-2

Client ID: CP-106B-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	10 10 10 20 10 10 10 10 10 10 10	

ND - Not Detected

POL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water Soil	
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	79	35 - 114	23 - 120
	65	43 - 116	30 - 115
	68	33 - 141	18 - 137
	18	10 - 94	24 - 113
	46	21 - 100	25 - 121
	97	10 - 123	19 - 122

# SOUND ANALYTICAL SERVICES, INC. ERVICES, IN

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 12 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-2

Client ID: CP-106B-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum

Hydrocarbons ND 1.0

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L POL Flag

Total Petroleum
Fuel Hydrocarbons ND 0.75

SURROGATE RECOVERY, %
1-chlorooctane 114
o-terphenyl 114

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,1-Trichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane	ND ND ND ND 2.9 4.3 ND	10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Bl, J
1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND ND ND ND	5 5 5 5 5	

ND - Not Detected POL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

8240 Continued . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	5 5 5 25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent			
Compound	Recovery	Water	Soil	
Toluene - D8 Bromofluorobenzene	103 93	88 - 110 86 - 115	81 - 117 74 - 121	
1,2-Dichloroethane-D4		76 - 114	70 - 121	

# SOUND ANALYTICAL SERVICES, INC. EXCLUSION, IN

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol bis(2-Chloroethyl) ether 2-Chlorophenol 1,3-Dichlorobenzene 1,4-Dichlorobenzene Benzyl Alcohol 1,2-Dichlorobenzene 2-Methylphenol bis(2-Chloroisopropyl)ether 4-Methylphenol N-Nitroso-Di-N-propylamine Hexachloroethane Nitrobenzene Isophorone 2-Nitrophenol 2,4-Dimethylphenol Benzoic Acid bis(2-Chloroethoxy)methane 2,4-Dichlorophenol	ND N	98 98 98 98 98 98 98 98 98 98 98 98 98 9	Flag
1,2,4-Trichlorobenzene Naphthalene 4-Chloroaniline Hexachlorobutadiene 4-Chloro-3-methylphenol	ND ND ND ND ND	98 98 200 98 200	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

#### EPA Method 8270 Continued

	Concentration	,	
Compound	ug/L	PQL	Flag
2-Methylnaphthalene	ND	98	*
Hexachlorocyclopentadiene	ND	98	
2,4,6-Trichlorophenol	ND	98	
2,4,5-Trichlorophenol	ND	98	
2-Chloronaphthalene	ND	98	
2-Nitroaniline	ND	490	
Dimethyl phthalate	ND	98	
Acenaphthylene	ND	98	
2,6-Dinitrotoluene	ND	98	
3-Nitroaniline	ND	490	
Acenaphthene	ND	98	
2,4-Dinitrophenol	ND	490	
4-Nitrophenol	ND	490	2
Dibenzofuran	ND	98	
2,4-Dinitrotoluene	ND	98	
Diethylphthalate	ND	98	
4-Chlorophenyl phenyl ether	. ND	98	
Fluorene	ND	98	
4-Nitroaniline	ND	490	19
4,6-Dinitro-2-methylphenol	ND	490	
N-Nitrosodiphenylamine	ND	98	
4-Bromophenyl phenyl ether	ND	98	
Hexachlorobenzene	ND	98	
Pentachlorophenol	ND	490	
Phenanthrene	ND	98	
Anthracene	ND	98	
Di-n-butylphthalate	ND	98	

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. ANALYTICAL, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	98 98 98 98 98 98 98 98 98 98 98	J

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water Soil	
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	X8 X8 X8 X8 X8	35 - 114 43 - 116 33 - 141 10 - 94 21 - 100 10 - 123	23 - 120 30 - 115 18 - 137 24 - 113 25 - 121 19 - 122

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-3

Client ID: CP-115A-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter	Concentration, mg/L	POL	Flag
Total Petroleum Hydrocarbons	4.4	1.0	

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93 Date Analyzed: 4-15-93

<u>Parameter</u>	Concentration, mg/L	POL	Flag
Total Petroleum Fuel Hydrocarbons	3.0	0.75	
TPH as	Diesel		*
SURROGATE RECOVERY, % 1-chlorooctane o-terphenyl	110 110		

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

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Lab Sample No. 31367-4

Client ID: CP-115B-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene	ND ND ND S4 1.5 ND	10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5	B1 J
Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND ND	5 5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

## SOUND ANALYTICAL SERVICES, INC. ERVICES, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-4

Client ID: CP-115B-0493

8240 Continued . . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

ND - Not Detected PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Toluene - D8	102	88 - 110	81 - 117
Bromofluorobenzene	92	86 - 115	74 - 121
1,2-Dichloroethane-D4	102	76 - 114	70 - 121

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-4

Client ID: CP-115B-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol	ND	10	
bis(2-Chloroethyl) ether	ND	10	
2-Chlorophenol	ND	10	
1,3-Dichlorobenzene	ND	10	
1,4-Dichlorobenzene	ND	10	
Benzyl Alcohol	ND	21	
1,2-Dichlorobenzene	ND	10	
2-Methylphenol	ND	10	
bis(2-Chloroisopropyl)ether	ND	10	
4-Methylphenol	ND	10	-
N-Nitroso-Di-N-propylamine	ND	10	
Hexachloroethane	ND	10	
Nitrobenzene	ND	10	
Isophorone	ND	10	
2-Nitrophenol	ND	10	
2,4-Dimethylphenol	ND	10	
Benzoic Acid	ND	52	
bis(2-Chloroethoxy)methane	ND	10	jië "nice
2,4-Dichlorophenol	ND	10	
1,2,4-Trichlorobenzene	ND	10	
Naphthalene	ND	10	
4-Chloroaniline	ND	21	
Hexachlorobutadiene	ND	10	
4-Chloro-3-methylphenol	ND	21	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-4

Client ID: CP-115B-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	10	
Hexachlorocyclopentadiene	ND	10	. 111
2,4,6-Trichlorophenol	ND	10	m . Ju
2,4,5-Trichlorophenol	ND	10	,
2-Chloronaphthalene	ND	10	
2-Nitroaniline	ND	52	
Dimethyl phthalate	ND	10	
Acenaphthylene	ND	10	
2,6-Dinitrotoluene	ND	10	
3-Nitroaniline	ND	52	
Acenaphthene	ND	10	d
2,4-Dinitrophenol	ND	52	E
4-Nitrophenol	ND	52	
Dibenzofuran	ND	10	8
2,4-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	ND	10	
Fluorene	ND	10	
4-Nitroaniline	ND	52	
4,6-Dinitro-2-methylphenol	ND	52	,
N-Nitrosodiphenylamine	ND	10	
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	52	
Phenanthrene	ND	10	
Anthracene	ND	10	
Di-n-butylphthalate	5.0	10	J

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. ERCYCES, IN

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-4

Benzo(b) fluoranthene

Benzo(k)fluoranthene

Indeno(1,2,3-cd)pyrene

Dibenz(a,h)anthracene

Benzo(q,h,i)perylene

Benzo(a)pyrene

EPA Method 8270 Continued

Client ID: CP-115B-0493

10

10

10

10

10

Concentration POL Flag uq/L Compound . 10 ND Fluoranthene 10 ND Pyrene 10 Butyl benzyl phthalate ND 21 ND 3,3'-Dichlorobenzidine 10 ND Benzo(a)anthracene 10 Chrysene ND bis(2-ethylhexyl)phthalate ND 10 Di-n-octyl phthalate 10 ND 10

ND

ND

ND

ND

ND

ND

ND - Not Detected PQL - Practical Quantitation Limit

Somi-Volatile Surrogates

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	74	35 - 114	23 - 120
	59	43 - 116	30 - 115
	67	33 - 141	18 - 137
	22	10 - 94	24 - 113
	49	21 - 100	25 - 121
	92	10 - 123	19 - 122

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-4

Client ID: CP-115B-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-94 Date Analyzed: 4-15-94

Parameter Concentration, mg/L PQL Flag

Total Petroleum
Hydrocarbons ND 1.0

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum
Fuel Hydrocarbons ND 0.75

SURROGATE RECOVERY, %
1-chlorooctane 119
o-terphenyl 124

ND - Not Detected PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. ROLLED, INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-5

Client ID: CP-915A-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene 1,1-Dichloroethene 1,2-Dichloroethene (Total) Chloroform 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND ND 1.6 5.4 ND	10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5	B1, J J

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-5

Client ID: CP-915A-0493

8240 Continued			
Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

ND - Not Detected PQL - Practical Quantitation Limit

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	102	88 - 110	81 - 117
	96	86 - 115	74 - 121
	102	76 - 114	70 - 121

## SOUND ANALYTICAL SERVICES, INC. 1740 CO., INC.

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-5

Client ID: CP-915A-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol	ND	41	
bis(2-Chloroethyl) ether	ND	41	
2-Chlorophenol	ND	41	
1,3-Dichlorobenzene	ND	41	
1,4-Dichlorobenzene	ND	41	
Benzyl Alcohol	ND	82	
1,2-Dichlorobenzene	ND	41	
2-Methylphenol	ND	41	
bis(2-Chloroisopropyl)ether	ND	41	
4-Methylphenol	ND	41	
N-Nitroso-Di-N-propylamine	ND	41	
Hexachloroethane	ND	41	
Nitrobenzene	ND	41	
Isophorone	ND	41	
2-Nitrophenol	ND	41	
2,4-Dimethylphenol	ND	41	
Benzoic Acid	ND	200	
bis(2-Chloroethoxy)methane	ND	41	
2,4-Dichlorophenol	ND	41	
1,2,4-Trichlorobenzene	ND	41	
Naphthalene	ND	41	
4-Chloroaniline	ND	82	
Hexachlorobutadiene	ND	41	
4-Chloro-3-methylphenol	ND	82	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

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Lab Sample No. 31367-5

Client ID: CP-915A-0493

### EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	41	
Hexachlorocyclopentadiene	ND	41	
2,4,6-Trichlorophenol	ND	41	à
2,4,5-Trichlorophenol	ND	41	
2-Chloronaphthalene	ND	41	
2-Nitroaniline	ND	200	
Dimethyl phthalate	ND	41	9
Acenaphthylene	ND	41	(A)
2,6-Dinitrotoluene	ND	41	- =
3-Nitroaniline	ND	200	
Acenaphthene	ND	41	
2,4-Dinitrophenol	ND	200	
4-Nitrophenol	ND	200	
Dibenzofuran	ND	41	
2,4-Dinitrotoluene	ND	41	
Diethylphthalate	ND	41	
4-Chlorophenyl phenyl ether	ND	41	
Fluorene	ND	41	
4-Nitroaniline	ND	200	
4,6-Dinitro-2-methylphenol	ND	200	
N-Nitrosodiphenylamine	ND ·	41	
4-Bromophenyl phenyl ether	ND	41	
Hexachlorobenzene	ND	41	
Pentachlorophenol	ND	200	
Phenanthrene	ND	41	
Anthracene	ND	41	
Di-n-butylphthalate	ND	41	

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. SHOULD SERVI

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 29 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-5

Client ID: CP-915A-0493

EPA Method 8270 Continued			1
Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	41 41 82 41 41 41 41 41 41 41 41	J

ND - Not Detected PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	69	35 - 114	23 - 120
	79	43 - 116	30 - 115
	88	33 - 141	18 - 137
	19	10 - 94	24 - 113
	52	21 - 100	25 - 121
	80	10 - 123	19 - 122

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Lab Sample No. 31367-5

Client ID: CP-915A-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum

Hydrocarbons 7.1 1.0

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93
Date Analyzed: 4-15-93

Total Petroleum
Fuel Hydrocarbons

TPH as

Diesel

SURROGATE RECOVERY, %
1-chlorooctane o-terphenyl

Concentration, mg/L

3.6

PQL
Flag

0.75

POL
Flag

1.5

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

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Lab Sample No. 31367-6

Client ID: CP-122B-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane	ND ND ND ND	20 20 20 20	
Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene	57 3.5 ND ND	10 100 10 10	B1 J
1,1-Dichloroethane 1,2-Dichloroethene (Total) Chloroform	ND ND ND	10 10 10	***
1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride	ND ND ND ND	10 50 10	
Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane	ND ND ND	50 10 10	
Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND 2.6 ND ND	10 10 10 10	J

ND - Not Detected

PQL - Practical Quantitation Limit

## SOUND ANALYTICAL SERVICES, INC. SERVICES, A

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 32 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-6

Client ID: CP-122B-0493

8240 Continued . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	10 10 10 50 10 10 10 10 10	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control Limits		
Compound	Recovery	Water	Soil	
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	104 98 97	88 - 110 86 - 115 76 - 114	81 - 117 74 - 121 70 - 121	

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 33 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-6

Client ID: CP-122B-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol	ND	10	
bis(2-Chloroethyl) ether	ND	10	
2-Chlorophenol	ND	10	1
1,3-Dichlorobenzene	ND	10	-
1,4-Dichlorobenzene	ND	10	1 8
Benzyl Alcohol	ND	21	
1,2-Dichlorobenzene	ND	10	
2-Methylphenol	ND	10	
bis(2-Chloroisopropyl)ether	ND	10	
4-Methylphenol	ND	10	× 11
N-Nitroso-Di-N-propylamine	ND	10	
Hexachloroethane	ND	10	
Nitrobenzene	ND	10	
Isophorone	ND	10	
2-Nitrophenol	ND	10	
2,4-Dimethylphenol	ND	10	
Benzoic Acid	ND	52	
bis(2-Chloroethoxy)methane	ND	10	
2,4-Dichlorophenol	ND	10	
1,2,4-Trichlorobenzene	ND	10	
Naphthalene	ND	10	
4-Chloroaniline	ND	21	1
Hexachlorobutadiene	ND	10	
4-Chloro-3-methylphenol	ND	21	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 34 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-6

Client ID: CP-122B-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	ND	10	
Hexachlorocyclopentadiene	ND	10	
2,4,6-Trichlorophenol	ND	10	11 11 11 11 11 11 11
2,4,5-Trichlorophenol	ND	10	
2-Chloronaphthalene	ND	10	
2-Nitroaniline	ND	52	
Dimethyl phthalate	ND	10	
Acenaphthylene	ND	10	
2,6-Dinitrotoluene	ND	10	
3-Nitroaniline	ND	52	
Acenaphthene	ND	10	
2,4-Dinitrophenol	ND	52	
4-Nitrophenol	ND	52	
Dibenzofuran	ND	10	
2,4-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	ND	10	
Fluorene	ND	10	2
4-Nitroaniline	ND	52	
4,6-Dinitro-2-methylphenol	ND	52	
N-Nitrosodiphenylamine	ND	10	2
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	52	
Phenanthrene	ND	10	
Anthracene	ND	10	
Di-n-butylphthalate	ND	10	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 35 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-6

EPA Method 8270 Continued

Client ID: CP-122B-0493

Compound ug/L POL Flag 10 ND Fluoranthene 10 ND Pyrene 10 ND Butyl benzyl phthalate 21 3,3'-Dichlorobenzidine ND 10 ND Benzo(a)anthracene

Concentration

10 Chrysene ND ND 10 bis(2-ethylhexyl)phthalate 10 Di-n-octyl phthalate 10 Benzo(b) fluoranthene ND Benzo(k)fluoranthene ND 10 10 ND Benzo(a)pyrene 10 Indeno(1,2,3-cd)pyrene ND Dibenz(a,h)anthracene ND 10 Benzo(g,h,i)perylene ND 10

ND - Not Detected PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water Soil	
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	68	35 - 114	23 - 120
	57	43 - 116	30 - 115
	60	33 - 141	18 - 137
	20	10 - 94	24 - 113
	47	21 - 100	25 - 121
	87	10 - 123	19 - 122

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 36 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-6

Client ID: CP-122B-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L PQL Flag

Total Petroleum
Hydrocarbons ND 1.0

TPH Per EPA SW-846 Modified Method 8015 Date Extracted: 4-15-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L POL Flag

Total Petroleum
Fuel Hydrocarbons ND 0.75

SURROGATE RECOVERY, %
1-chlorooctane 114
o-terphenyl 130

ND - Not Detected PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INCSERVICES, IN

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 37 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-7

Client ID: Trip Blank #5

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene 1,1-Dichloroethane 1,2-Dichloroethene (Total) Chloroform 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene		PQL  10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5	Flag B1
Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane	ND ND	5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 38 of 38 Lab No. 31367 April 20, 1993

Lab Sample No. 31367-7

Client ID: Trip Blank #5

8240 Continued .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	5 5 5 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control Limits	
Compound	Recovery	Water Soil	
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	103	88 - 110	81 - 117
	95	86 - 115	74 - 121
	102	76 - 114	70 - 121

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

### Page 1 of 2

Client: Burlington Environmental, Technical Services

Lab No: 31367qc3

Units: ug/L

Date: April 20, 1993

Blank No: V9909

METHOD BLANK					
Compound	Result	PQL	Flags		
Compound  Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone		PQL  10 10 10 10 55 55 55 55 55 55 55 55 55 55 55 55 55	Flags		
Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND ND ND ND ND	5 5 5 5 5 5			

ND - Not Detected

PQL - Practical Quantitation Limit

# SOUND ANALYTICAL SERVICES, INC. LA CLES, IN

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc3

Date:

April 20, 1993

Blank No: V9909

VOLATILE SURROGATES

Surrogate	Percent Recovery	Contro	l Limits Soil
Toluene - d8 Bromofluorobenzene 1,2-Dichloroethane d4	106	86 - 115	81 - 117
	86	76 - 114	74 - 121
	101	88 - 110	70 - 121

## SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS - METHOD 8240

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc6

Units:

uq/L

Date:

April 30, 1993

BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

	DIMITAL	01 1111						
Parameter	Blank Spike Result (BS)	Spike Added (SA)	%R	Blank Spike Dup Result (BSD)	Spike Added (SA)	%R	RPD	Flag
1,1-DCE	48	50	96.0	49	50	98.0	4.1	
TCE	47	50	94.0	48	50	96.0	2.1	12
Chloro- benzene	48	50	96.0	49	50	98.0	2.1	4
Toluene	50	50	100	50	50	100	0.0	
Benzene	47	50	94.0	49	50	98.0	4.2	,

%R = Percent Recovery

 $= (BS / SA) \times 100$ 

RPD = Relative Percent Difference

 $= [(BS - BSD) / ((BS + BSD) / 2)] \times 100$ 

ND - Not Detected

ADVISORY LIMITS	RPD	<pre>% RECOVERY</pre>
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons by Method 8015

Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc1

Matrix:

Water

Units:

mg/L

Date:

April 20, 1993

#### DUPLICATE

Dup. No. 31367-1

Parameter	Sample (S)	Duplicate (D)	RPD	PQL	Flags
Total Petroleum Fuel Hydrocarbons	ND	ND	0.0	0.75	
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	114 119	88 95			

RPD = relative percent difference =  $[(S - D) / ((S + D) / 2)] \times 100$ 

### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MS/MSD No. 31367-1

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	₹Ŗ	Spike Dup Result (MSD)	RPD
Total Petroleum Fuel Hydrocarbons	ND	410	402	102	412	0.5

%R = Percent Recovery

 $= [(MS - SR) / SA] \times 100$ 

RPD = Relative Percent Difference

 $= [(MS - MSD) / ((MS + MSD) / 2)] \times 100$ 

### QUALITY CONTROL REPORT

### Total Petroleum Fuel Hydrocarbons by Method 8015

Page 2 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc1

Units:

mg/L

Date:

April 20, 1993

#### BLANK SPIKE RECOVERY

BS No. 004F0101.D			
Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	337	84

%R = Percent Recovery
= [(BS - SR) / SA] x 100

#### METHOD BLANK

Blank No. 003R0101.D		
Parameter	Result	PQL
Total Petroleum Fuel Hydrocarbons	ND	0.75
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	108 117	

ND - Not Detected PQL - Practical Quantitation Limit

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

TPH by Method 418.1

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc2

Units:

mg/L

Date:

April 20, 1993

METHOD BLANK

	THE PROPERTY OF THE PARTY OF TH	
Parameter	Result	PQL
Total Petroleum Hydrocarbons	ND	1.0

ND - Not Detected

PQL - Practical Quantitation Limit

#### BLANK SPIKE RECOVERY

Parameter	Spike Added	Spike Recovered	%R
TPH	10	7.7	77

%R = Percent Recovery

 $= [(BS / SA] \times 100]$ 

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### QUALITY CONTROL REPORT

### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 1 of 3

Client: Burlington Environmental, Technical Services

Client Lab No:

31367qc4

ug/L

Date:

April 20, 1993

Blank No: SBLK89-S8428

METHOD BLANK								
Compound	Result	PQL	Flags					
Phenol	ND .	10						
bis(2-Chloroethyl) ether	ND	10	*					
2-Chlorophenol	ND	10						
1,3-Dichlorobenzene	ND	10	11.					
1,4-Dichlorobenzene	ND	10	-					
Benzyl Alcohol	ND	20	1					
1,2-Dichlorobenzene	ND	10						
2-Methylphenol	ND	10						
bis(2-Chloroisopropyl)ether	ND	10						
4-Methylphenol	ND	10						
N-Nitroso-Di-N-propylamine	ND	10						
Hexachloroethane	ND	10						
Nitrobenzene	ND	10						
Isophorone	ND	10						
2-Nitrophenol	ND	10						
2,4-Dimethylphenol	ND	10						
Benzoic Acid	ND	50						
bis(2-Chloroethoxy)methane	ND	10						
2,4-Dichlorophenol	ND	10						
1,2,4-Trichlorobenzene	. ND	10						
Naphthalene	ND	10						
4-Chloroaniline	ND	20						
Hexachlorobutadiene	ND	10						
4-Chloro-3-methylphenol	ND	20						
2-Methylnaphthalene	ND	10						
Hexachlorocyclopentadiene	ND	10						
2,4,6-Trichlorophenol	ND	10	×					
2,4,5-Trichlorophenol	ND	10						
2-Chloronaphthalene	ND	10						
2-Nitroaniline	ND	50						
Dimethyl phthalate	ND	10						
Acenaphthylene	ND	10						

PQL - Practical Quantitation Limit

ND - Not Detected

### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 2 of 3

Client:

Burlington Environmental, Technical Services

Lab No: 31367qc4

Units:

ug/L

Date:

April 20, 1993

Blank No: SBLK89-S8428

METHOD BL	ANK
-----------	-----

Compound	Result	PQL	Flags
Compound			
3-Nitroaniline	ND	50	
Acenaphthene	ND	10	
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	ND	10	
2,4-Dinitrotoluene	ND	10	
2,6-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	ND	10	
Fluorene	ND	10	
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	ND	10	
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	50	
Phenanthrene	ND	10	101
Anthracene	ND	10	# (1) T
Di-n-butylphthalate	ND	10	
Fluoranthene	ND	10	-
Pyrene	ND	10	
Butyl benzyl phthalate	ND	10	
3,3'-Dichlorobenzidine	ND	20	
Benzo(a)anthracene	ND	10	
	ND	10	1 1 ×
bis(2-ethylhexyl)phthalate	ND	10	
Chrysene	ND	10	
Di-n-octyl phthalate	ND	10	
Benzo(b)fluoranthene	•	10	
Benzo(k)fluoranthene	ND		201
Benzo(a)pyrene	ND	10	
Indeno(1,2,3-cd)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

PQL - Practical Quantitation Limit

ND - Not Detected

# SOUND ANALYTICAL SÉRVICES, INC. SURVICES, E

### QUALITY CONTROL REPORT

### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 3 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31367qc4

Date:

April 20, 1993 Blank No: SBLK89-S8428

	SEMITO	SEMIVOLATILE SURROGATES						
Surrogate	Percent	Control	Limits					
	Recovery	Water	Soil					
Nitrobenzene - d5	76	35 - 114	23 - 120					
2-Fluorobiphenyl	62	43 - 116	30 - 115					
p-Terphenyl-d14	73	33 - 141	18 - 137					
Phenol-d6	27	10 - 94	24 - 113					
2-Fluorophenol	52	21 - 100	25 - 121					
2,4,6-TBP	72	10 - 123	19 - 122					

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### WATER BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

Client Name:

Burlington Environmental, Technical Services

Lab No:

31367qc5

Date:

April 20, 1993

SEMI-VOLATILE ORGANICS										
COMPOUND	01	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS		
Phenol	100	ND	25.0	25.0	24.6	24.6	1.6			
2-Chlorophenol	100	ND	57.8	57.8	59.2	59.2	2.4			
1,4-Dichlorobenzene	100	ND	55.1	55.1	50.7	50.7	8.3			
N-nitrosodi-n-Propylamine	100	ND	63.1	63.1	62.5	62.5	1.0			
1,2,4-Trichlorobenzene	100	ND	61.5	61.5	57.3	57.3	7.1			
4-Chloro-3-Methylphenol	100	ND	56.5	56.5	58.2	58.2	3.0			
Acenaphthene	100	ND	58.4	58.4	56.6	56.6	3.1			
4-Nitrophenol	100	ND	20.4	20.4	21.2	21.2	2.9	, , , , , , , , , , , , , , , , , , ,		
2,4 Dinitrotoluene	100	ND	62.7	62.7	61.2	61.2	2.4			
Pentachlorophenol	100	ND	42.5	42.5	49.5	49.5	15			
Pyrene	100	ND	72.6	72.6	74.9	74.9	3.1			

RPD = Relative Percent Difference

<sup>%</sup> REC = Percent Recovery

ADVISORY LIMITS:	RPD	% RECOVERY
Phenol 2-Chlorophenol 1,4-Dichlorobenzene N-nitrosodi-n-	42 40 28	12 - 89 27 - 123 36 - 97
Propylamine 1,2,4-Trichlorobenzene 4-Chloro-3-Methylphenol Acenaphthene 4-Nitrophenol 2,4 Dinitrotoluene Pentachlorophenol	38 28 42 31 50 38 50	41 - 116 39 - 98 23 - 97 46 - 118 10 - 80 24 - 96 9 - 103 26 - 127

# SOUND ANALYTICAL SERVICES, INC. STATES

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### DATA QUALIFIER FLAGS

Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation ND: limit, corrected for sample dilution. The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity. J: The identification of this analyte was confirmed by GC/MS. C: This analyte was also detected in the associated method blank. The reported sample results have been adjusted for moisture, B1: final exract volume, and/or dilutions performed during extract preparation. The analyte concentration was evaluated prior to sample preparation adjustments, and was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank). This analyte was also detected in the associated method blank. However, the analyte concentration in the sample was B2: determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank). The concentration of this analyte exceeded the instrument calibration range. E: The reported result for this analyte is calculated based on a secondary dilution factor. D: This TIC is a suspected aldol-condensation product. A: Quantitation Limits are elevated due to matrix interferences. M: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an S: estimated quantity. Contaminant does not appear to be "typical" product. Elution pattern suggests it may be X1: Contaminant does not appear to be "typical" product. Further testing is suggested for identification. X2: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended. X3: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous. X4: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit. X4a: X5: Matrix spike was diluted out during analysis. Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results. X6: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data. X7: RPD value for MS/MSD outside QC limits due to high contaminant levels. X7a: X8: Surrogate was diluted out during analysis. X9: Surrogate recovery outside QC limits due to matrix composition.

Surrogate recovery outside QC limits due to high contaminant levels.

X10:



210 Wesl Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173

### **CHAIN-OF-CUSTODY RECORD**

C.O.C. SERIAL NO. 6323

618/281-7173 618/281-5120 FAX													
PROJECT NAME PIER 91		4	6/	_/	$\langle \cdot \rangle /$	/ /.			/ /	PRESER-			
PROJECT NUMBER CZ4878 MAJOR TASK 7306	S	4	5/	$\mathcal{S}_{\lambda}$	Y:	://	$\sqrt{}$	/ /		ATIVES			
LAB DESTINATION SOLVED ANALYTICA SERVICE	NEB -	ANA FOR	3/03	1/6			/ /		/ /	57		REMARKS	LIFOT
LAB DESTINATION SOLVED ANALYTICA SERVICE	- OF	1 /	-1/	4	\/.	/		/ /		2		ANALYSIS REQ BER IF APPLICA	
SAMPLE DATE TIME S SAMPLE LOGATION	NO. OF CONTAINERS	V	U/V		* 6	7/				\$ 00E	Ana.		
9-9-93 1100 VCP-115M-0493	5	2	1	1	1			1	V	j		14-	
4-9-93 1130 / CP-106B-0493	5	2	1	1	1		_	V,	1	-		.,,	
4-9-93 15-30 JCP-115A-0493		3	1	1	1			V	/	-			
4-9-93 1500 VCP-115B-0493		2		-	1			V	1	-			
X 4-9-93 1530 VCP-915A-0493 4-9-93 1830 VCP-122B-0493	5	2	-	-	1			1	1				
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BE-34 (1/92)

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### TRANSMITTAL MEMORANDUM

RECEIVED

MAY 1 7 1993

Burlington Environmental Inc. Technical Services

DATE: May 14, 1993

TO:

David Broten, Burlington Environmental Engineering

PROJECT NAME: Pier 91

PROJECT NUMBER: 624878-7306

LABORATORY NUMBER: 31409

Enclosed are one original and one copy of the Tier II data deliverables package for Laboratory Work Order Number 31409. The samples were received for analysis at Sound Analytical Services, Inc., on April 13, 1993.

If there are any questions regarding this data package, please do not hesitate to call me at (206) 922-2310.

Fildell

Sincerely,

Andrew J. Riddell Project Manager

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

May 13, 1993

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7306

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 31409

The samples were taken on 4/12/93 and were received at Sound on 4/13/93. The samples were analyzed for Volatile Organics in accordance with EPA SW-846 Method 8240, Semivolatile Organics in accordance with EPA SW-846 Method 8270, Total Petroleum Hydrocarbons by EPA Method 418.1 modified for soil, and Total Petroleum Fuel Hydrocarbons by EPA Method 8015 modified. One oil sample was qualitatively screened for total petroleum fuel hydrocarbons in accordance with WA State DOE Method WTPH-HCID. The density of the oil sample was determined in accordance with Standard Methods for the Examination of Water and Wastewater (16th Ed.) Method 213 E.

#### VOLATILE ORGANICS

Samples 31409-1 through 31409-3 were analyzed on 4/16/93 and 4/19/93. Methylene chloride was detected in the method blanks at levels above the IDL. Results reported for methylene chloride in the associated samples were flagged B to indicate this. All QC parameters were within acceptance limits.

#### SEMIVOLATILE ORGANICS

Samples 31409-1 and 31409-2 were extracted on 4/15/93 and analyzed on 4/16/93. No compounds were detected in the method blank above the IDL. All QC parameters were within acceptance limits.

#### TOTAL PETROLEUM FUEL HYDROCARBONS

Samples 31409-1 and 31409-2 were extracted on 4/15/93 and analyzed on 4/16/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

#### TOTAL PETROLEUM HYDROCARBONS

Samples 31409-1 and 31409-2 were extracted on 4/14/93 and analyzed on 4/15/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

#### HYDROCARBON IDENTIFICATION

Sample 31409-4 was extracted on 4/16/93 and analyzed on 4/19/93. No contamination above the PQL was present in the method blank.

#### SPECIFIC GRAVITY

The specific gravity for sample 31409-4 was determined on 4/16/93.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS AND A STATE ANALYSIS ANALYSIS AND A STATE ANALYSIS AND A STATE ANALYSIS AND A STATE A

Report To: Burlington Environmental, Date: April 22, 1993

Technical Services

Report On: Analysis of Oil & Water Lab No.: 31409

Page 1 of 15

IDENTIFICATION:

Samples received on 04-13-93 Project: 624878-7306 Pier 91

ANALYSIS:

Lab Sample No. 31409-1

Client ID: CP-121-0493

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL		Flag
Chloromethane	ND		10	
Bromomethane	ND		10	
Vinyl Chloride	ND		10	
Chloroethane	ND		10	
Methylene Chloride	4.0	10 %	5	B1, J
Acetone	ND	-9	50	
Carbon Disulfide	ND		5	
1,1-Dichloroethene	ND		5	
1,1-Dichloroethane	ND		5	
1,2-Dichloroethene (Total)	ND		5	
Chloroform	0.77		5	J
1,2-Dichloroethane	1.2		5	J
2-Butanone	ND	<u> </u>	25	
1,1,1-Trichloroethane	0.82		5	J .
Carbon Tetrachloride	ND		5	
Vinyl Acetate	ND		25	
Bromodichloromethane	ND		5	
1,2-Dichloropropane	ND	1**	5	
Cis-1,3-Dichloropropene	ND		5	
Trichloroethene	3.3		5	J ·
Dibromochloromethane	ND		5	
1,1,2-Trichloroethane	ND		5	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 2 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-1

Client ID: CP-121-0493

8240 Continued . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND ND ND ND 0.69 ND ND ND ND ND ND ND ND	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

ND - Not Detected

POL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	111	88 - 110	81 - 117
	87	86 - 115	74 - 121
	103	76 - 114	70 - 121

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 3 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-1

Client ID: CP-121-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Compound	Concentration ug/L	PQL	Flag
Phenol bis(2-Chloroethyl) ether 2-Chlorophenol 1,3-Dichlorobenzene 1,4-Dichlorobenzene Benzyl Alcohol 1,2-Dichlorobenzene 2-Methylphenol bis(2-Chloroisopropyl)ether 4-Methylphenol N-Nitroso-Di-N-propylamine Hexachloroethane		9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6	Flag
Nitrobenzene Isophorone 2-Nitrophenol 2,4-Dimethylphenol Benzoic Acid bis(2-Chloroethoxy)methane 2,4-Dichlorophenol 1,2,4-Trichlorobenzene Naphthalene 4-Chloroaniline Hexachlorobutadiene 4-Chloro-3-methylphenol	ND N	9.6 9.6 9.6 9.6 48 9.6 9.6 9.6 9.6 19	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 4 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-1

Client ID: CP-121-0493

#### EPA Method 8270 Continued

	Concentration	DOL	Elac
Compound	ug/L	PQL	Flag
2-Methylnaphthalene	ND	9.6	
Hexachlorocyclopentadiene	ND	9.6	
2,4,6-Trichlorophenol	ND	9.6	
2,4,5-Trichlorophenol	ND	9.6	
2-Chloronaphthalene	ND	9.6	
2-Nitroaniline	ND	48	
Dimethyl phthalate	ND	9.6	
Acenaphthylene	ND	9.6	
2,6-Dinitrotoluene	ND	9.6	
3-Nitroaniline	ND	48	
Acenaphthene	ND	9.6	
2,4-Dinitrophenol	ND	48	
4-Nitrophenol	ND	48	
Dibenzofuran	ND	9.6	
2,4-Dinitrotoluene	ND	9.6	
Diethylphthalate	ND	9.6	10
4-Chlorophenyl phenyl ether	ND	9.6	
Fluorene	ND	9.6	
4-Nitroaniline	ND	48	
4,6-Dinitro-2-methylphenol	ND	48	
N-Nitrosodiphenylamine	ND	9.6	
4-Bromophenyl phenyl ether	ND	9.6	
Hexachlorobenzene	ND	9.6	
Pentachlorophenol	ND	48	
Phenanthrene	ND	9.6	
Anthracene	ND	9.6	
Di-n-butylphthalate	2.4	9.6	J

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 5 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-1

Client ID: CP-121-0493

EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
Fluoranthene Pyrene Butyl benzyl phthalate 3,3'-Dichlorobenzidine Benzo(a)anthracene Chrysene bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	ND N	9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6	J

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	69	35 - 114	23 - 120
	64	43 - 116	30 - 115
	67	33 - 141	18 - 137
	23	10 - 94	24 - 113
	44	21 - 100	25 - 121
	80	10 - 123	19 - 122

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 6 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-1

Client ID: CP-121-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93 Date Analyzed: 4-15-93

Parameter Concentration, mg/L POL Flag

Total Petroleum

Hydrocarbons ND 1.0

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 4-15-93
Date Analyzed: 4-16-93

Parameter Concentration, mg/L POL Flag

Total Petroleum
Fuel Hydrocarbons, mg/L ND 0.75

SURROGATE RECOVERY, %
1-chlorooctane 109
o-terphenyl 115

ND - Not Detected PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 7 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

Client ID: CP-110-0493

Volatile Organics by Method 8240 Date Analyzed: 4-19-93

Compound	Concentration ug/L	PQL	Flag
Compound  Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Acetone Carbon Disulfide 1,1-Dichloroethene 1,1-Dichloroethene 1,2-Dichloroethene (Total) Chloroform 1,2-Dichloroethane 2-Butanone 1,1,1-Trichloroethane Carbon Tetrachloride Vinyl Acetate Bromodichloromethane 1,2-Dichloropropane Cis-1,3-Dichloropropene Trichloroethene		PQL  10 10 10 10 55 55 55 55 55 55 55 55 55 55 55 55 55	Flag
Dibromochloromethane 1,1,2-Trichloroethane	ND ND	5 5	

ND - Not Detected

PQL - Practical Quantitation Limit

Continued . . . .

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91

Page 8 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

Client ID: CP-110-0493

8240 Continued . .

OZ 10 COMOZNACA			
Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	5.8 ND ND ND ND ND 1.3 ND 1.7 ND 3.1	5 5 5 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	J J

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits
Compound	Recovery	Water	Soil
Toluene - D8 Bromofluorobenzene 1,2-Dichloroethane-D4	104	88 - 110	81 - 117
	86	86 - 115	74 - 121
	103	76 - 114	70 - 121

Continued . . .

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 9 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

Client ID: CP-110-0493

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

	+		+
Compound	Concentration ug/L	PQL	Flag
Phenol	ND	9.6	
bis(2-Chloroethyl) ether	ND	9.6	
2-Chlorophenol	ND	9.6	
1,3-Dichlorobenzene	ND	9.6	
1,4-Dichlorobenzene	ND	9.6	
Benzyl Alcohol	ND	19	
1,2-Dichlorobenzene	ND	9.6	
2-Methylphenol	ND	9.6	
bis(2-Chloroisopropyl)ether	ND	9.6	
4-Methylphenol	ND	9.6	
N-Nitroso-Di-N-propylamine	ND	9.6	
Hexachloroethane	ND	9.6	
Nitrobenzene	ND	9.6	
Isophorone	ND	9.6	
2-Nitrophenol	ND	9.6	
2,4-Dimethylphenol	ND	9.6	
Benzoic Acid	ND	48	
bis(2-Chloroethoxy)methane	ND	9.6	
2,4-Dichlorophenol	ND	9.6	
1,2,4-Trichlorobenzene	ND	9.6	
Naphthalene	ND	9.6	
4-Chloroaniline	ND	· 19	
Hexachlorobutadiene	ND	9.6	
4-Chloro-3-methylphenol	ND	19	

ND - Not Detected

PQL - Practical Quantitation Limit

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91

Page 10 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

Client ID: CP-110-0493

#### EPA Method 8270 Continued

Compound	Concentration ug/L	PQL	Flag
2-Methylnaphthalene	2.7	9.6	J
Hexachlorocyclopentadiene	ND	9.6	
2,4,6-Trichlorophenol	ND	9.6	
2,4,5-Trichlorophenol	ND	9.6	
2-Chloronaphthalene	ND	9.6	
2-Nitroaniline	ND	48	
Dimethyl phthalate	ND	9.6	
Acenaphthylene	ND	9.6	
2,6-Dinitrotoluene	ND	9.6	
3-Nitroaniline	ND	48	
Acenaphthene	2.6	9.6	J
2,4-Dinitrophenol	ND	48	
4-Nitrophenol	ND	48	
Dibenzofuran	ND	9.6	
2,4-Dinitrotoluene	ND	9.6	
Diethylphthalate	ND	9.6	
4-Chlorophenyl phenyl ether	ND	9.6	
Fluorene	6.8	9.6	J
4-Nitroaniline	ND	48	
4,6-Dinitro-2-methylphenol	ND	48	
N-Nitrosodiphenylamine	ND	9.6	
4-Bromophenyl phenyl ether	ND	9.6	
Hexachlorobenzene	ND	9.6	
Pentachlorophenol	ND	48	
Phenanthrene	4.1	9.6	J
Anthracene	ND	9.6	
Di-n-butylphthalate	1.4	9.6	J

ND - Not Detected

PQL - Practical Quantitation Limit

Continued . . .

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 11 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

EPA Method 8270 Continued

Client ID: CP-110-0493

Concentration uq/L POL Flag Compound 9.6 Fluoranthene ND 9.6 ND Pyrene 9.6 Butyl benzyl phthalate ND 3,3'-Dichlorobenzidine ND 19 9.6 Benzo(a)anthracene ND

9.6 ND Chrysene 9.6 bis(2-ethylhexyl)phthalate ND 9.6 Di-n-octyl phthalate ND Benzo(b) fluoranthene ND 9.6 9.6 Benzo(k)fluoranthene ND 9.6 ND Benzo(a)pyrene 9.6 Indeno(1,2,3-cd)pyrene ND 9.6 Dibenz(a,h)anthracene ND 9.6 Benzo(g,h,i)perylene ND

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent	Control	Limits
	Recovery	Water	Soil
Nitrobenzene - d <sub>5</sub> 2-Fluorobiphenyl p-Terphenyl-d <sub>14</sub> Phenol-d <sub>6</sub> 2-Fluorophenol 2,4,6-Tribromophenol	65	35 - 114	23 - 120
	63	43 - 116	30 - 115
	69	33 - 141	18 - 137
	25	10 - 94	24 - 113
	47	21 - 100	25 - 121
	90	10 - 123	19 - 122

Continued . . . .

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 12 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-2

Client ID: CP-110-0493

TPH Per EPA Method 418.1 Date Extracted: 4-14-93

Date Analyzed: 4-15-93

PQL Flag Concentration, mq/L Parameter

Total Petroleum Hydrocarbons

ND

1.0

TPH Per EPA SW-846 Modified Method 8015

Date Extracted: 4-15-93 Date Analyzed: 4-16-93

Concentration, mg/L PQL Flag Parameter

Total Petroleum

0.75 ND Fuel Hydrocarbons, mg/L

SURROGATE RECOVERY, %

109 1-chlorooctane 112 o-terphenyl

ND - Not Detected PQL - Practical Quantitation Limit

Continued . . .

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 13 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-3

Client ID: Trip Blank #6

Volatile Organics by Method 8240 Date Analyzed: 4-16-93

			-
Compound	Concentration ug/L	PQL	Flag
Chloromethane Bromomethane	ND ND	20 20	
Vinyl Chloride	ND	20	
Chloroethane	ND	20	
Methylene Chloride	58	10	B1
Acetone	ND	100	
Carbon Disulfide	ND	10	
1,1-Dichloroethene	ND	10	
1,1-Dichloroethane	ND	10	
1,2-Dichloroethene (Total)	ND	10	
Chloroform	ND	10	
1,2-Dichloroethane	ND	10	
2-Butanone	ND	50	8 11 -
1,1,1-Trichloroethane	ND	10	
Carbon Tetrachloride	ND	10	
Vinyl Acetate	ND	50	
Bromodichloromethane	ND ND	10 10	
1,2-Dichloropropane	ND ND	10	
Cis-1,3-Dichloropropene Trichloroethene	ND ND	10	
	ND ND		
Dibromochloromethane 1,1,2-Trichloroethane	ND ND	10	
1,1,2 IIIomIoIocchane	1	10	

ND - Not Detected PQL - Practical Quantitation Limit

Continued . . .

Burlington Environmental, Technical Services

Project: 624878-7306 Pier 91

Page 14 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-3

Client ID: Trip Blank #6

8240 Continued . . .

Compound	Concentration ug/L	PQL	Flag
Benzene Trans-1,3-Dichloropropene Bromoform 4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethane Toluene Chlorobenzene Ethyl Benzene Styrene Total Xylenes	ND N	10 10 10 50 10 10 10 10 10	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate	Percent	Control	Limits Soil
Compound Toluene - D8	Recovery	Water 88 - 110	81 - 117
Bromofluorobenzene 1,2-Dichloroethane-D4	95 103	86 - 115 76 - 114	74 - 121 70 - 121

Continued . . . .

Burlington Environmental, Technical Services Project: 624878-7306 Pier 91 Page 15 of 15 Lab No. 31409 April 22, 1993

Lab Sample No. 31409-4

Client ID: CP-110-0493

Matrix: Oil

WTPH-HCID

Date Extracted: 4-16-93 Date Analyzed: 4-20-93

Parameters	Concentration, mg/kg	Flag
Gasoline (C7-C12)	> 20	
Diesel (> C12 - C24)	> 50	
Heavy Oil (C24+)	< 100	
SURROGATE RECOVERY, %		
1-chlorooctane o-terphenyl		X10 X10

ND - Not Detected POL - Practical Quantitation Limit

Result Parameter 0.9506 Specific Gravity

## SOUND ANALYTICAL SERVICES, INC. THE TOTAL SERVICES, INC. THE SERVICES, INC. THE TOTAL SERVICES, INC. THE SERVICES, INC.

#### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

### Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc1

Units: uq/L

April 22, 1993

Blank No: V9909

METHOD BLANK

Compound	Result	PQL	Flags
Chloromethane	ND	10	
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	5.3	5	
Acetone	ND	50	
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND		
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5 5 5 5 5	
Chloroform	ND	5	
1,2-Dichloroethane	ND	5	
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	5	
1,2-Dichloropropane	ND	5	
Cis-1,3-Dichloropropene	ND	5 5 5 5	
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	
1,1,2-Trichloroethane	ND	5	
Benzene	ND	5	
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5	
Toluene	ND	5	
Chlorobenzene	ND	5	
Ethyl Benzene	ND	5	
Styrene	ND	5	
Total Xylenes	ND	5	
TOCAL AYTERES	ND	5	

ND - Not Detected

PQL - Practical Quantitation Limit

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Client: Burlington Environmental, Technical Services
Lab No: 31409qc1

Date:

April 22, 1993

Blank No: V9909

VOI ATTIE SUPPOCATES

Surrogate	Percent Recovery	Contro	l Limits Soil
Toluene - d8 Bromofluorobenzene 1,2-Dichloroethane d4	106	86 - 115	81 - 117
	86	76 - 114	74 - 121
	101	88 - 110	70 - 121

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS PER EPA METHOD 8240

#### Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc2

Units:

ug/L

Date:

April 22, 1993

Blank No: V9958

METHOD BLANK

Compound	Result	PQL	Flags
Compound	Nesuic	FQL	riags
Chloromethane	ND	10	
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	4.2	5	J
Acetone	ND	50	
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND	5	
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5	
Chloroform	ND	5	
1,2-Dichloroethane	ND	5	
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	5	
1,2-Dichloropropane	ND	5	
Cis-1,3-Dichloropropene	ND	. 5	2
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	
1,1,2-Trichloroethane	ND	5	
Benzene	ND	5	
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5 5	
Toluene	ND	5	
Chlorobenzene	ND	5 5 5 5	
Ethyl Benzene	ND	5	
Styrene	ND	. 5	V.
Total Xylenes	ND	5	

ND - Not Detected

PQL - Practical Quantitation Limit

## SOUND ANALYTICAL SERVICES, INC. STEELINGS

### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Burlington Environmental, Technical Services

Lab No: 31409qc2

April 22, 1993

Blank No: V9958

VOLATILE SURROGATES

Surrogate	Percent Recovery		l Limits Soil
Toluene - d8	101	86 - 115	81 - 117
Bromofluorobenzene	87	76 - 114	74 - 121
1,2-Dichloroethane d4	103	88 - 110	70 - 121

## SOUND ANALYTICAL SERVICES, INC. STRVICES -

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

#### VOLATILE ORGANICS - METHOD 8240

Client,:

Burlington Environmental, Technical Services

Lab No:

31409qc3

Units:

ug/L

Date:

April 22, 1993

#### BLANK SPIKE RECOVERY

Date Analyzed: 4-16-93

			CIMICALIA		0 00			
Parameter	Blank Spike Result (BS)	Spike Added (SA)	%R	Blank Spike Dup Result (BSD)	Spike Added (SA)	%R	RPD	Flag
1,1-DCE	48	50	96	49	50	98	4.1	5
TCE	47	50	94	48	50	96	2.1	
Chloro- benzene	48	50	96	49	50	98	2.1	
Toluene	50	50	100	50	50	100	0.0	
Benzene	47	50	94	49	50	98	4.2	

%R = Percent Recovery

 $= [(BS / SA] \times 100]$ 

RPD = Relative Percent Difference

=  $[(BS - BSD) / ((BS + BSD) / 2] \times 100$ 

ND - Not Detected

ADVISORY LIMITS	RPD	<pre>% RECOVERY</pre>
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

# SOUND ANALYTICAL SERVICES, ANCHER OF THE

## SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### QUALITY CONTROL REPORT

### VOLATILE ORGANICS - METHOD 8240

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc4

Units:

ug/L

Date:

April 22, 1993

#### BLANK SPIKE RECOVERY

Date Analyzed: 4-19-93

Parameter	Blank Spike Result (BS)	Spike Added (SA)	%R	Blank Spike Dup Result (BSD)	Spike	%R	RPD	Flag
1,1-DCE	52	50	104	53	50	106	1.9	7
TCE	50	50	100	55	50	110	9.5	
Chloro- benzene	51	50	102	54	50	108	5.7	
Toluene	54	50	108	59	50	118	8.8	4
Benzene	50	50	100	54	50	108	7.7	

%R = Percent Recovery

 $= [(BS / SA] \times 100]$ 

RPD = Relative Percent Difference

 $= [(BS - BSD) / ((BS + BSD) / 2] \times 100$ 

ND - Not Detected

ADVISORY LIMITS	RPD	% RECOVERY
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### QUALITY CONTROL REPORT

#### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 1 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc5

Units:

ug/L

Date:

April 22, 1993 Blank No: SBLK89-S8428

METHOD BLANK						
Compound	Result	PQL	Flags			
Phenol	ND	10				
bis(2-Chloroethyl) ether	ND .	10				
2-Chlorophenol	ND	10	"			
1,3-Dichlorobenzene	ND	10				
1,4-Dichlorobenzene	ND	10				
Benzyl Alcohol	ND	20				
1,2-Dichlorobenzene	ND	10				
2-Methylphenol	ND	10				
bis(2-Chloroisopropyl)ether	ND	10				
4-Methylphenol	ND	10				
N-Nitroso-Di-N-propylamine	ND	10				
Hexachloroethane	ND	10				
Nitrobenzene	ND	10				
Isophorone	ND	10	*			
2-Nitrophenol	ND	. 10				
2,4-Dimethylphenol	ND	10	24			
Benzoic Acid	ND	50	99			
bis(2-Chloroethoxy)methane	ND	10				
2,4-Dichlorophenol	ND	10				
1,2,4-Trichlorobenzene	ND	10				
Naphthalene	ND	10				
4-Chloroaniline	ND	20				
Hexachlorobutadiene	ND	10				
4-Chloro-3-methylphenol	ND	20				
2-Methylnaphthalene	ND	10				
Hexachlorocyclopentadiene	ND	10				
2,4,6-Trichlorophenol	ND	10				
2,4,5-Trichlorophenol	ND	10				
2-Chloronaphthalene	ND	10				
2-Nitroaniline	ND	50				
Dimethyl phthalate	ND	10				
Acenaphthylene	ND	10				

PQL - Practical Quantitation Limit

ND - Not Detected

#### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 2 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc5

Units:

ug/L

Date:

April 22, 1993

Blank No: SBLK89-S8428

METHOD BLANK						
Compound	Result	PQL	Flags			
3-Nitroaniline	ND	50				
Acenaphthene	ND	10				
2,4-Dinitrophenol	ND	50				
4-Nitrophenol	ND	50				
Dibenzofuran	ND	10				
2,4-Dinitrotoluene	ND	10				
2,6-Dinitrotoluene	ND	10				
Diethylphthalate	ND	10				
4-Chlorophenyl phenyl ether	ND	10				
Fluorene	ND	10				
4-Nitroaniline	ND	50				
4,6-Dinitro-2-methylphenol	ND	50				
N-Nitrosodiphenylamine	ND	10				
4-Bromophenyl phenyl ether	ND	10				
Hexachlorobenzene	ND	10				
Pentachlorophenol	ND	50				
Phenanthrene	ND	10				
Anthracene	ND	10				
Di-n-butylphthalate	ND	10				
Fluoranthene	ND	10				
Pyrene	ND	10				
Butyl benzyl phthalate	ND	10				
3,3'-Dichlorobenzidine	ND	20				
Benzo(a)anthracene	ND	10				
bis(2-ethylhexyl)phthalate	ND	10				
Chrysene	ND	10				
Di-n-octyl phthalate	ND	10				
Benzo(b)fluoranthene	ND	10				
Benzo(k)fluoranthene	ND	10				
Benzo(a)pyrene	ND	10				
Indeno(1,2,3-cd)pyrene	ND	10				
Dibenz(a,h)anthracene	ND	10				
Benzo(q,h,i)perylene	ND	10				
(3//-/						

PQL - Practical Quantitation Limit

ND - Not Detected

#### **OUALITY CONTROL REPORT**

#### SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 3 of 3

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc5

April 22, 1993 Blank No: SBLK89-S8428

SEMIVOLATILE SURROGATES						
Surrogate	Percent	Control	Limits			
	Recovery	Water	Soil			
Nitrobenzene - d5	76	35 - 114	23 - 120			
2-Fluorobiphenyl	62	43 - 116	30 - 115			
p-Terphenyl-d14	73	33 - 141	18 - 137			
Phenol-d6	27	10 - 94	24 - 113			
2-Fluorophenol	52	21 - 100	25 - 121			
2,4,6-TBP	72	10 - 123	19 - 122			

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### WATER MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name:

Burlington Environmental, Technical Services

Jab No:

31409qc6

)ate:

April 22, 1993

SEMI-	VOLATILE	ORGAN	ICS

SEMI	-VOLATI	LE ORGA	MICS			-	
SPIKE (ug/L)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS
100	ND	25.0	25.0	24.6	24.6	1.61	
100	ND	57.8	57.8	59.2	59.2	2.39	
100	ND	55.1	55.1	50.7	50.7	8.32	
100	ND	63.1	63.1	62.5	62.5	0.96	
100	ND	61.5	61.5	57.3	57.3	7.07	
100	ND	56.5	56.5	58.2	58.2	2.96	»- I
100	ND	58.4	58.4	56.6	56.6	3.13	=   =
100	ND	20.6	20.6	21.2	21.2	2.87	
100	ND	62.7	62.7	61.2	61.2	2.42	
100	ND	42.5	42.5	49.5	49.5	15.2	
100	ND	72.6	72.6	74.9	74.9	3.12	at i
	SPIKE (ug/L)  100  100  100  100  100  100  100  1	SPIKE (ug/L) SAMPLE (ug/L) ND  100 ND	SPIKE (ug/L)       SAMPLE RESULT       CONC MS         100       ND       25.0         100       ND       57.8         100       ND       55.1         100       ND       63.1         100       ND       61.5         100       ND       56.5         100       ND       58.4         100       ND       20.6         100       ND       62.7         100       ND       42.5	(ug/L)         RESULT         MS         REC           100         ND         25.0         25.0           100         ND         57.8         57.8           100         ND         55.1         55.1           100         ND         63.1         63.1           100         ND         61.5         61.5           100         ND         56.5         56.5           100         ND         58.4         58.4           100         ND         20.6         20.6           100         ND         62.7         62.7           100         ND         42.5         42.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC         CONC MSD           100         ND         25.0         25.0         24.6           100         ND         57.8         57.8         59.2           100         ND         55.1         55.1         50.7           100         ND         63.1         63.1         62.5           100         ND         61.5         57.3           100         ND         56.5         56.5         58.2           100         ND         58.4         56.6         56.6           100         ND         20.6         20.6         21.2           100         ND         62.7         62.7         61.2           100         ND         42.5         42.5         49.5	SPIKE (ug/L)         SAMPLE (ug/L)         CONC MS         % REC         CONC MSD         % REC           100         ND         25.0         25.0         24.6         24.6           100         ND         57.8         57.8         59.2         59.2           100         ND         55.1         55.1         50.7         50.7           100         ND         63.1         63.1         62.5         62.5           100         ND         61.5         57.3         57.3           100         ND         56.5         56.5         58.2         58.2           100         ND         58.4         56.6         56.6         56.6           100         ND         20.6         20.6         21.2         21.2           100         ND         62.7         62.7         61.2         61.2           100         ND         42.5         42.5         49.5         49.5	SPIKE (ug/L)         SAMPLE RESULT         CONC MS         % REC         CONC MSD         % REC         RPD           100         ND         25.0         25.0         24.6         24.6         1.61           100         ND         57.8         57.8         59.2         59.2         2.39           100         ND         55.1         55.1         50.7         50.7         8.32           100         ND         63.1         63.1         62.5         62.5         0.96           100         ND         56.5         56.5         58.2         58.2         2.96           100         ND         58.4         58.4         56.6         56.6         3.13           100         ND         20.6         20.6         21.2         21.2         2.87           100         ND         62.7         62.7         61.2         61.2         2.42           100         ND         42.5         42.5         49.5         49.5         15.2

PD = Relative Percent Difference

REC = Percent Recovery

OVISORY LIMITS:	RPD	<pre>% RECOVERY</pre>
nenol -Chlorophenol ,4-Dichlorobenzene -nitrosodi-n-	42 40 28	12 - 89 27 - 123 36 - 97
Propylamine ,2,4-Trichlorobenzene -Chloro-3-Methylphenol cenaphthene	38 28 42 31	41 - 116 39 - 98 23 - 97 46 - 118
-Nitrophenol 4 Dinitrotoluene -ntachlorophenol /rene	50 38 50 31	10 - 80 24 - 96 9 - 103 26 - 127

# SOUND ANALYTICAL SERVICES, INC. SERVICES, I

### SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons by Method 8015

### Page 1 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc7

Matrix:

Water

Units:

mg/L

Date:

April 22, 1993

#### DUPLICATE

Dup. No. 31367-1		Batch	Q.C.		
Parameter	Sample (S)	Duplicate (D)	RPD	PQL	Flags
Total Petroleum Fuel Hydrocarbons	ND	ND	0.0	0.75	
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	114 119	88 95			

RPD = relative percent difference =  $[(S - D) / ((S + D) / 2)] \times 100$ 

#### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MS/MSD No. 31367-1		Batch O	.C.			
Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	RPD
Total Petroleum Fuel Hydrocarbons	ND	410	402	102	412	0.5

%R = Percent Recovery

 $= [(MS - SR) / SA] \times 100$ 

RPD = Relative Percent Difference

 $= [(MS - MSD) / ((MS + MSD) / 2)] \times 100$ 

# SOUND ANALYTICAL SERVICES, INC. STRANGER

### QUALITY CONTROL REPORT

## Total Petroleum Fuel Hydrocarbons by Method 8015

Page 2 of 2

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc7

Units:

mg/L

Date:

April 22, 1993

#### BLANK SPIKE RECOVERY

BS No. 004F0101.D

Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	337	84

%R = Percent Recovery
= [(BS - SR) / SA] x 100

#### METHOD BLANK

Blank No. 003F0101.D

Parameter	Result	PQL
Total Petroleum Fuel Hydrocarbons	ND	0.75
SURROGATE RECOVERY% 1-chlorooctane o-terphenyl	108 117	

ND - Not Detected

PQL - Practical Quantitation Limit

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### QUALITY CONTROL REPORT

#### WTPH-HCID

Client:

Burlington Environmental, Technical Services

Lab No:

31409qc8

Units: Date:

mg/kg

April 22, 1993

#### METHOD BLANK

Blank No

Blank No. UUSFUIUI.D		
Parameter	Result	Flags
Gasoline (C <sub>7</sub> -C <sub>12</sub> )	< 20	- E
Diesel (>C <sub>12</sub> -C <sub>24</sub> )	< 50	
Heavy Petroleum Oil	< 100	÷
SURROGATE RECOVERY, % 1-chlorooctane o-terphenyl	95 92	

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

### **DATA QUALIFIER FLAGS**

ND:	Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.
J:	The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.
C:	The identification of this analyte was confirmed by GC/MS.
B1:	This analyte was also detected in the associated method blank. The reported sample results have been adjusted for moisture, final exact volume, and/or dilutions performed during extract preparation. The analyte concentration was evaluated prior to sample preparation adjustments, and was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).
B2:	This analyte was also detected in the associated method blank. However, the analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).
E:	The concentration of this analyte exceeded the instrument calibration range.
D:	The reported result for this analyte is calculated based on a secondary dilution factor.
A:	This TIC is a suspected aldol-condensation product.
M:	Quantitation Limits are elevated due to matrix interferences.
S:	The calibration quality control criteria for this compound were not met. The reported concentration should be considered an estimated quantity.
X1:	Contaminant does not appear to be "typical" product. Elution pattern suggests it may be
X2:	Contaminant does not appear to be "typical" product. Further testing is suggested for identification.
X3:	Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.
X4:	RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous.
X4a:	RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit.
X5:	Matrix spike was diluted out during analysis.
X6:	Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.
X7:	Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.
X7a:	RPD value for MS/MSD outside QC limits due to high contaminant levels.
X8:	Surrogate was diluted out during analysis.
X9:	Surrogate recovery outside QC limits due to matrix composition.

Surrogate recovery outside QC limits due to high contaminant levels.

X10:

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

### **CHAIN-OF-CUSTODY RECORD**

C.O.C. SERIAL NO. 6325

PRESER-PROJECT NAME **VATIVES** MAJOR TASK 7306 PROJECT NUMBER NO. OF CONTAINERS SAMPLERS CHEMICALS A TOLK REMARKS LAB DESTINATION ANALYTICAL SERVICE 400E0 (CHEMICAL ANALYSIS REQUEST FORM NUMBER IF APPLICABLE) Som of the second SAMPLE-LOCATION 1CED SAMPLE DATE TIME NO. CP-121-0493 4-12-93 1530 m plant & **RECEIVED BY RELINQUISHED BY** SIGNATURE DATE TIME SIGNATURE TIME DATE 11:45 SHIPPING NOTES LAB NOTES

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

### RECEIVED

#### TRANSMITTAL MEMORANDUM

MAY 1 9 1993

Burlington Environmental Inc. Technical Services

DATE: May 17, 1993

TO:

David Broten, Burlington Environmental Engineering

PROJECT NAME: Pier 91

PROJECT NUMBER: 624878-7306

LABORATORY NUMBER: 31448

Enclosed are one original and one copy of the Tier II data deliverables package for Laboratory Work Order Number 31448. The samples were received for analysis at Sound Analytical Services, Inc., on April 15, 1993.

If there are any questions regarding this data package, please do not hesitate to call me at (206) 922-2310.

Sincerely,

Andrew J. Riddell Project Manager